



CANADA
4-H Ontario

www.4-hontario.ca

4-H ONTARIO PROJECT



Let's Get Growing
A Guide to Food Gardening Throughout the Seasons

REFERENCE MANUAL

THE 4-H PLEDGE

I pledge my Head to clearer thinking,
my Heart to greater loyalty,
my Hands to larger service,
my Health to better living,
for my club, my community and my country.

THE 4-H MOTTO

Learn To Do By Doing

4-H ONTARIO PROVINCIAL OFFICE

111 Main Street, Box 212

Rockwood, ON N0B 2K0

TF: 1.877.410.6748

TEL: 519.856.0992

FAX: 519.856.0515

EMAIL: inquiries@4-hontario.ca

WEB: www.4-HOntario.ca



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PROJECT RESOURCE INFORMATION:

Written by: Sandra Snyder

Layout by: Mary-Kathleen Dunn

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Thank you to the 4-H Let's Get Growing Advisory Committee members who assisted with the creation of this resource:

Marian Comper, Toronto Master Gardeners

Paulette MacDonald, 4-H Volunteer, Sudbury District 4-H Association

Jenn Pfenning, Pfenning's Organic Vegetables

Elaine Roddy, Vegetable Crop Specialist, OMAFRA

Nathan Stevens, Manager, Horticulture Crops, Agriculture Development Branch, OMAFRA

Thank you to the 4-H Club that piloted this project.

Club Leaders – Brenda Dunster, Karen Elliott & Shirley Whitmore; Club Members – Emma Elliott, Sarah Elliott, Daniel Haggett, Dahlia Jacques, Deacon Scott, Hayden Simpson, Angus Sinclair, Chloe Waycik; Leeds 4-H Association

4-H Ontario is pleased to be able to provide project resource reference manuals for use by volunteers in clubs. 4-H Ontario screens and trains volunteers to equip them with the tools to serve as positive role models for youth. With so many topics to choose from, 4-H volunteers are trusted to use these resources to provide safe and quality programming while using their judgement to assess the appropriateness of activities for their particular group of youth. By downloading any 4-H resource, you agree to use it for 4-H purposes and give credit to the original creators. Your provincial 4-H organization may have restrictions on the types of 4-H projects or activities which can be completed in your region.

4-H Ontario grants permission to 4-H Volunteers to photocopy this 4-H project resource for use in their local 4-H program. All information presented in this Project Resource was accurate at the time of printing.

The development of this project resource was made possible through the support of the Grand River Agricultural Society.





4-H Inclusion Statement

4-H in Canada is open to all* without discrimination based on race, national or ethnic origin, colour, religion, sex, age or, mental or physical disability.**

4-H is dedicated to providing a safe and inclusive environment that allows for universal access and participation. Where barriers to participation are identified, 4-H will, with reasonable accommodation, adapt programs, rules, policies, or expectations to reduce or remove the barriers.

Any accommodations, changes or exceptions will be assessed on an individual basis, taking into account the individual experience of the member and their family. The physical safety and emotional well-being of members, leaders, staff and volunteers is 4-H's highest priority, and is the ultimate consideration in final decisions.

4-H Canada and local 4-H organizations consider inclusion a priority. Leaders are encouraged to work with individuals and their families to identify and discuss accommodations as required, and to reach out to provincial or national office staff for help with unresolved concerns.

**This applies to youth members (ages 6 to 21), volunteers, leaders, staff and professionals.*

***Definition of discrimination as per Canadian Charter of Rights and Freedoms.*

Déclaration sur l'inclusion des 4-H

L'adhésion aux 4-H au Canada est ouverte à tous les jeunes* sans discrimination fondée sur la race, l'origine nationale ou ethnique, la couleur de la peau, la religion, le sexe, l'âge ou le handicap mental ou physique. **

Les 4-H ont pour mission d'offrir un environnement sécuritaire et inclusif qui permet l'accès et la participation de tous. Lorsque des obstacles à la participation sont décelés, les 4-H adapteront, à l'aide de mesures d'adaptation raisonnables, les programmes, les règles, les politiques ou les attentes afin de réduire ou d'éliminer ces obstacles.

Toute mesure d'adaptation, modification ou exception sera évaluée au cas par cas, en tenant compte de l'expérience personnelle du membre et de sa famille. La sécurité physique et le bien-être émotionnel des membres, des animateurs et des animatrices, des membres du personnel et des bénévoles sont la priorité absolue des 4-H et constituent le facteur ultime à considérer lors de la prise des décisions définitives.

Les 4-H du Canada et les organisations locales des 4-H considèrent l'inclusion comme étant une priorité. Les animateurs et les animatrices sont encouragés à collaborer avec les personnes et leurs familles afin de définir et d'examiner les mesures d'adaptation, selon les besoins, et de communiquer avec le personnel du bureau provincial ou national pour obtenir de l'aide en cas de préoccupations non résolues.

**Ceci s'applique aux jeunes membres (âgés de 6 à 21 ans), aux bénévoles, aux animateurs, aux membres du personnel et aux professionnels.*

***Selon la définition de discrimination en vertu de la Charte canadienne des droits et libertés*

WELCOME TO 4-H ONTARIO'S LET'S GET GROWING PROJECT!

Welcome to 4-H Ontario's Let's Get Growing project! This resource was developed to introduce members to gardening on any scale, whether it's a large garden or field in the country, a garden in the backyard, a community garden or container gardening on a balcony.

This manual contains twelve units, three for each season. It doesn't matter what time of year this project runs – there's information and activities in this project for any time of year!

HOW TO USE THIS MANUAL

4-H Ontario's Let's Get Growing project is made up of 2 parts:

1. THE REFERENCE BOOK:

The reference book is laid out into 12 meetings. There are three meetings for each season:

Unit A – Winter – Make A Garden Plan

Unit B – Winter – Build Garden Structures

Unit C – Winter – Make Compost

Unit D – Spring – Starting Seeds

Unit E – Spring – Spring Plant and Soil Care

Unit F – Spring – Classifying, Pruning, Thinning and Supporting Plants

Unit G – Summer – Garden Challenges

Unit H – Summer – Weeding and Watering

Unit I – Summer – Harvesting and Exhibiting Produce

Unit J – Fall – Harvesting and Preserving Produce

Unit K – Fall – Soil Testing and Amendment

Unit L – Fall – Fall Planting and Readying Plants for Winter

Each meeting has been broken down into an Introduction with Sample Meeting agendas, References and Resources, Topic Information and Activities.

Sample Meeting Agendas: are at the beginning of each meeting. The agendas give suggestions for topic information, activities and judging and/or communications activities along with suggested times for each section. These are only suggestions – you will know your group best and will know the skill and attention level of your members. There is more topic information and activities than what can be completed in a two hour meeting. Be creative!

Activities: should be used in combination with the discussion of topic information to teach members in a hands-on, interactive learning environment.

2. THE RECORD BOOK

This booklet is designed to make it easier for members to record information throughout the club. Members are to record their expectations and goals for the project in addition to contact information, meeting dates and roll calls. Print or photocopy pages from the Reference Book that you think will benefit the members either as a resource or an activity.

The Record Book should be given to each member at the beginning of the first meeting. Ask members to keep it in a binder or duotang so they can add to it easily.

Go through the Record Book with the members and explain the charts and forms. Encourage them to use their Record Books at every meeting and record as much information as possible. As an added incentive, a prize could be given at the end of the project for the best Record Book.

INCLUDING STEM IN THE 4-H LET'S GET GROWING PROJECT

WHAT IS STEM AND WHY IS IT IMPORTANT?

Since 1915, 4-H in Ontario has engaged youth in science, technology, engineering, and math (STEM). This has traditionally meant a solid focus on agricultural science, mechanics, entrepreneurship, natural sciences and household science. Today, 4-H has grown to include rocketry, robotics, computer science, environmental sciences, and more. 4-H provides hands-on learning experiences to encourage learning about the world around us. Our lives are completely immersed in science and technology.

Understanding how science, engineering, and technology impact our lives, solve problems and create new ones makes it easier to navigate our modern world.

In school, science classes need to cover a broad range of topics in a limited amount of time while STEM in 4-H allows members and leaders time to dig deeper into ideas and concepts and to spend as much time as desired to work on projects based on personal interests, questions, and skills.

STEM in 4-H allows a person to work on their own questions, design their own tests, create their own models, build their understanding, and share their work with others – learn to do by doing. That's what science and engineering are, trying to understand the natural universe and develop solutions to the problems faced in our world today. Science is inquiry that uses a specific approaches and skills. But all learning is an inquiry process so working with science helps develop your learning muscles.

Within 4-H, the STEM process can go even further to include the Arts, thus changing the acronym to STEAM – Science, Technology, Engineering, Art & Math.

STEAM in 4-H Ontario Projects

As you work through the Let's Get Growing Project, you will see STEAM integrated throughout the project within almost all of the activities that members will be completing.

STEAM can be challenging but it can also be fun! Be sure to try out the activities. Observe what works and what doesn't and how activities can be changed slightly to get different results. It's all a part of the STEAM learning process!

PLANNING A MEETING

Plan your meetings well. Review all the information well in advance so you are prepared and ready!

BEFORE EACH MEETING:

- Read the topic information and activities and photocopy any relevant resources for the members' Record Books.
- Be familiar with the topic information for each meeting. Think of imaginative ways to present the information to the members. Do not rely on just reading the information out loud. Review available resources, plan the meetings and choose activities and themes that complement the ages and interests of your members.
- Gather any equipment and/or resources that will be needed to complete the meeting.
- At least 12 hours of club meeting time is required for every project; including club business, specific project information and social recreation. The delivery format for that material is left to the discretion of the leaders. Before each meeting, create a timeline to ensure that you are providing an adequate amount of instructional time for club completion. **Note:** the best practice recommendation is that a club have multiple meeting times for each project.

Included on the following page is a Leader's Planning Chart to help with the planning of meetings. In addition to the chart, keep track of what went well and what should be changed next time. That way, each time this project is run, the content of the meetings can be different!

When planning each meeting, a typical 4-H meeting agenda should include the following:

- Welcome & Call to Order
- 4-H Pledge
- Roll Call
- Parliamentary Procedure:
 - Secretary's Report
 - Treasurer's Report (if any)
 - Press Report
 - New Business: local and provincial 4-H activities/opportunities, upcoming club activities
- Meeting content and activities
- Clean-up
- Social Recreation and/or refreshments
- Adjournment

JUDGING AND COMMUNICATIONS:

Each meeting must include either a judging or public speaking activity.

- Judging gives the members an opportunity to use judging techniques as part of the

learning process. Through judging, members learn to evaluate, make decisions and communicate with others. They also develop critical thinking skills, confidence and self-esteem. Many examples are used in this reference book but use your imagination! As long as members are setting criteria and critically thinking about where items fit within that set of criteria, they are learning the basic skills of judging!

- A communications activity has been provided for each meeting but can be included in the Roll Call or social recreation time. These activities do not need to involve the topic of gardening as the outcome is more about understanding the concepts of effective communication.

LEADER'S PLANNING CHART

Meeting #	Date/Place/ Time	Topics Covered	Activities	Materials Needed

As a club volunteer your responsibilities are to:

- Complete the volunteer screening process and attend a volunteer training session.
- Notify the local association of the club, arrange a meeting schedule and participate in club meetings, activities and the Achievement program.
- Review the project material in the Reference and Record books to familiarize yourself with the information and adapt it to fit your group. Be well organized and teach the material based on your group’s age, interest and experience level.
- Organize the club so members gain parliamentary procedure, judging and communication skills.
- Have membership lists completed and submitted along with fee collected (if applicable) by the end of the second meeting.
- Have members fill out a Participant Agreement Form and identify any health concerns. Ensure that all members, leaders and parent helpers know the appropriate actions during any emergency. Check with members for any food allergies or dietary restrictions and plan snacks accordingly.

As a club member your responsibilities are to:

- Participate in at least 2/3 of his/her own club meeting time. Clubs must have a minimum of 12 hours of meeting time.
- Complete the project requirement to the satisfaction of the club leaders.
- Take part in the project Achievement Program.
- Fill in and complete the Record Book.
- Complete any other project as required by the club leaders.

Achievement Program Ideas/Suggestions

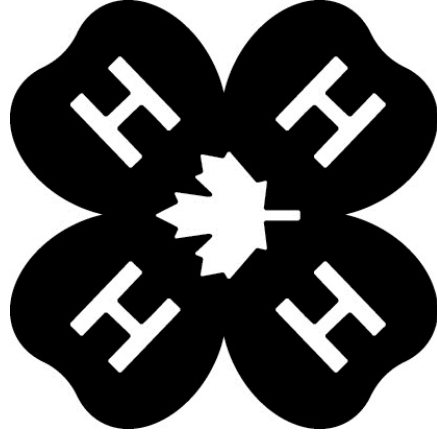
- After consulting with your municipality, create a garden somewhere in your community and exhibit or preserve the produce grown from this garden.
- Make a display about Let’s Get Growing and display it at a local fair, in the mall, in a store front, etc.
- Have members make a presentation at school about gardening and how young people can grow their own food.
- Create a skit about the gardening process and perform it at school, at a senior’s home, at another organization’s meeting, etc.

SPECIAL PROJECTS

These projects are done outside of meeting time and are for members interested in doing more – often senior members. It’s up to you as the leader to decide if you will require members to complete a Special Project for club completion. Some ideas include:

- Write a press release about gardening in your area.
- Interview someone who grows a large garden and write a press release for the newspaper about them and what they do with the produce they grow.
- Create a display showing the path of food from the seed to harvesting.
- Create a video about any aspect of Let's Get Growing found in the project. Post on YouTube.

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WINTER - UNIT A: MAKE A GARDEN PLAN

SETTING OBJECTIVES:

Taking the time to make a garden plan will ensure that your efforts to grow your own fruits, vegetables and herbs have the best chance of success.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members understand that each garden site has unique benefits and challenges when it comes to soil, sun, water and wind.
- Members have explored a variety of garden styles/ planting methods.
- Members have designed a garden plan for their site.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Types of soil
- Growing needs of plants: sun, water, wind and other considerations
- Planting methods: traditional garden rows, square foot gardens, raised beds, vertical gardens, hanging gardens, container gardens and windowsill gardens
- Companion planting, consecutive plantings and succession planting/intercropping

ACTIVITIES:

1. Examining soil texture
2. Make a rain gauge
3. Make a garden plan

Sample Meeting Agenda Time: 3 hours 20 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Election of Officers Club Business	20 min
Topic Information	Where will your garden grow? Soil	20 min
Activity	Activity #1: Examining Soil Texture	30 min
Topic Information	Sun Water	20 min
Activity	Activity #2: Make a Rain Gauge	20 min
Topic Information	Wind Other Considerations How Will Your Garden Grow? What Will Your Garden Grow?	30 min
Activity	Activity #3: Make a Garden Plan	30 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

WHERE WILL YOUR GARDEN GROW?

No matter where you live it is possible to grow your own fruits, vegetables and herbs! Whether a traditional garden with rows of produce or a hanging basket of salad greens, successfully growing your own fresh produce is simply a matter of evaluating your site and choosing plants that will thrive in those conditions.

Gardens can be grown in yards, in community plots, on patios, balconies and rooftops, in hanging baskets and vertical structures, and on windowsills.

The first step to designing a garden plan is choosing a site. Once you have decided where to locate your garden you need to evaluate four factors:

1. What kind of soil is in your garden and/or what kind of soil or other medium will you need to use in your containers or raised beds?
2. How much sun does your garden site receive?
3. How much water does your garden site receive? Is additional water readily available?
4. How windy is your garden site?

SOIL

The Soil Science Society of America defines soil as the unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants. Soil scientists use a variety of methods to classify soils, but the one of most interest to gardeners is soil texture.

Within soil are three main particles — sand, silt and clay — and the amount of each particle type determines soil texture.

1. Sand: the largest of these particles (0.1-2.0 mm); drains well
2. Silt: finer than sand (0.05-0.002 mm); holds water better than sand
3. Clay: smallest particle (≤ 0.002); does not drain well

Most soil is a combination of these particles, and when the composition is 40 per cent sand, 40 per cent silt and 20 per cent clay it is known as loam, which is considered the ideal soil for plants. Soil that has more sand than the other two particles is called “sandy loam”, more silt gives us “silty loam” and more clay results in “clay loam”.

Share It!

Where would you like to grow your own produce? (Could be a group or individual plan.)



Look it up!

You can look at soil classification across Canada on the Agriculture and Agri-Food Canada website <http://www.agr.gc.ca>

While it is possible to change the composition of garden soil over time, it is better to begin by choosing plants that will flourish in your particular soil.



Plants for sandy soils: Root vegetables like beets, carrots, parsnips, potatoes, radishes, sweet potatoes and turnips, along with onion, garlic, asparagus, many herbs, raspberries and blackberries.

Do It!

Activity: Examining soil texture

Plants for clay soils: Cruciferous vegetables like bok choy, broccoli, Brussels sprouts and cabbage, apple and pear trees.



Did you know the “soil” used in container gardening usually does not include any real soil? The ingredients in potting soil include things like composted bark, composted manure, compost, peat moss, worm castings, coir, perlite, vermiculite, lime and fertilizer. Potting soil is lighter and fluffier than garden soil to give plants grown in containers the best possible combination of air, water, and nutrients.

SUN

All plants need light to support their growth.

How much sunlight your garden site receives each day will help you decide which plants to choose. Is your garden site...

Full sun: Six or more hours of direct sunlight each day?



Partially shaded: Two to six hours of direct sunlight each day?

Lightly shaded: One to two hours of direct sunlight each day?

Deeply shaded or fully shaded: No direct sun and little or no reflected light?

Look it up!

Watch a video about photosynthesis, the process in which the energy from sunlight is used by green plants and certain other organisms to form complex substances from carbon dioxide and water.

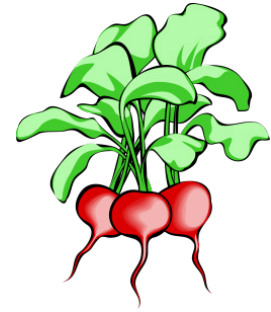
Full sun gives gardeners the greatest choice in plant selection, while deep/full shade is not well suited to growing fruits and vegetables. If your garden site is partially or lightly shaded you could increase the amount of sunlight your plants will receive by pruning away low tree branches and thinning out high branches or painting nearby fences and walls white to reflect light into the garden. Paths and stones in light colours will also provide reflected light. You can also use containers that can be moved through the growing season to take advantage of the sunniest spots in the garden.

Plants for full-sun gardens: Almost every vegetable will grow in the full-sun garden, but there are some that really flourish in these conditions including beans, corn, cucumbers, peas, peppers, squash and tomatoes; herbs include



borage, dill, lavender, oregano and rosemary; fruits include blueberries, grapes, apple, fig, peach and sweet cherry trees.

Plants for lightly or partially shaded gardens: vegetables include arugula, beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, chard, Chinese cabbage, garlic, kale, kohlrabi, leaf lettuce, leeks, mustard, parsnips, peas, potatoes, radishes, rutabagas, spinach, turnips and watercress; herbs include basil, catnip, chervil, chives, lemon balm, lovage, mint, parsley and rosemary; fruits include blackberries, currants, gooseberries, raspberries, rhubarb, sour cherry, pear and plum trees.



WATER

Plants draw water and nutrients from the soil through their root system, distributing the nutrients through the plant. Plants also release water into the air through their leaves, a process called transpiration which can be accelerated by heat and wind.

The soil in your garden site and the amount of sun it receives will impact the amount of water it requires. Sandy soil drains faster than clay and full sun causes greater transpiration than shade. Water needs can also be impacted by the location of your garden site. Avoid sites on a slope, which will cause water to drain away from plants, or in low lying, boggy areas, which could cause plants to become waterlogged.

Look it up!

Watch a video about the water cycle to learn how plants contribute to the earth's atmosphere.

Rooftop, balcony and container gardens, both indoor and outdoor, also require careful monitoring of water needs as they can be exposed to more heat and/or wind than gardens planted at ground level.

On average plants need 2.5 centimetres (1 inch) of water per week. Some of that water will be supplied by rainfall, but it is helpful to locate the garden near an easily accessed water source for hand watering.

Do It!

Activity: Make a rain gauge

WIND

The direction and speed of prevailing winds will also have an impact on your garden site.

If your garden site is in a particularly windy area you can help your crops thrive by choosing shorter varieties, building a windbreak or shelter, and/or supporting them with a stake or trellis.

OTHER CONSIDERATIONS

A few other factors may impact where you choose to locate your garden.

i) Gardens should not be located near Black Walnut trees, which produce a toxin called juglone. Juglone can reduce or prevent the growth of some plants. If you cannot avoid planting near a Black Walnut tree visit the Ontario Ministry of Agriculture Food and Rural Affairs website <http://www.omafra.gov.on.ca> (or http://www.omafra.gov.on.ca/english/crops/facts/info_walnut

[toxicity.htm](#)), which offers a list of plants that are tolerant of juglone.

ii) If your garden site was once commercially cultivated (sprayed with herbicides or pesticides) you should wait for four years before planting fruit, vegetables and herbs. If four years have not passed opt for containers and/or a closed-bottom raised bed filled with fresh soil.

iii) If you live in an urban area where soil contamination is a concern it is also better to choose containers or closed-bottom raised beds filled with fresh soil.

iv) Gardens should also be located a fair distance away from cultivated fields to prevent the possibility of overspray of herbicides and/or pesticides onto the fruits, vegetables and herbs.

Experience It!

Visit a community garden (or watch a video) to see a variety of planting styles and garden designs.

HOW WILL YOUR GARDEN GROW?

There are a wide variety of planting styles and garden designs. The one you choose will depend on your garden site, what and how much you want to grow, and what you find most appealing.

PLANTING IN ROWS:

If your garden site is fairly large you can choose to plant in rows. Crops are planted in parallel rows with a walking path 45 to 90 centimetres (18 to 36 inches) wide in between each row. You can plant in single rows (seeding in a line down the middle), wide rows (several lines of seed down the row) or a combination of both.

Plants for single rows (width depends on needs of each plant): Corn, tomatoes, pole beans, trellised peas and cucumbers, raspberries, blackberries, blueberries, strawberries

Plants for wide rows (no wider than 1.5 metres [5 feet]): lettuce, spinach, chard, kale, bush beans, radishes, carrots, peas, beets, onions, leeks, garlic, parsnips, most herbs.

Rows can be as long or short as you like. It is helpful to place taller plants on the north side of the garden so they do not shade their neighbours. It also helps to plant perennial fruits and vegetables (like asparagus and raspberries) and annual vine crops (like squash and watermelon)



on the edges of the garden.










SQUARE-FOOT GARDENS:

In square-foot gardens each section, approximately 1.5 metres (4 feet) square, is closely planted with one crop. Squares can be raised or level with the paths that run between them. There are many books and online resources that offer assistance with spacing requirements for square-foot gardens. As an example, you can plant 36 carrot seeds in one square and eight pea seeds in another.

RAISED BEDS:

If you have poor soil and/or drainage, live in an area with a short growing season, or are physically unable to garden at ground-level, raised beds are an excellent solution. Raised beds are also visually appealing to many gardeners.

Raised beds offer good drainage and the elevated soil warms faster in the spring, extending the planting season. Since you do not have to walk on it, the soil in a raised bed does not become compacted and it is easy to create the ideal soil conditions for the plants you want to grow.

8 Pea Plants 	16 Carrot Plants 	4 Head Lettuce Plants 
1 Tomato Plant 	2 Cucumber Plants 	16 Radish Plants 
9 Spinach Plants 	1 Hot Pepper Plant 	1 Pumpkin Plant 



Typically built from wood, raised beds can also be constructed from straw bales, rocks and bricks. Raised beds can be as little as 15 centimetres (6 inches) off the ground, or as tall as 92 centimetres (36 inches). They can have an open or closed bottom and be set on soil, gravel, concrete, or a patio.

VERTICAL GARDENS:

If space is short in your garden site, vertical structures can maximize your ability to grow fruits, vegetables and herbs. Trellises of various shapes, multi-level raised beds and planters, living walls and other structures allow gardeners to grow a wide variety of produce in almost any location.



HANGING GARDENS:

Even without a spot to grow at ground level you can grow a variety of fruits, vegetables and herbs. Among the plants that adapt well to hanging baskets are beans, cabbage, cucumbers, eggplant, lettuce, peppers, strawberries, tomatoes and many herbs.

CONTAINER GARDENS, INDOORS AND OUT:

Almost any container can serve as a garden, from a traditional pot to a bag of soil! You can grow potatoes in a barrel or zucchini in a basket. A sunny windowsill can grow salad greens or herbs.

If your garden site is on a balcony or rooftop, it is important

to know how much weight the balcony or roof can bear. Measure the weight of each container filled with wet “soil” to calculate the total weight of your garden plan. Make sure to add the weight of any structures to the total.



WHAT WILL YOUR GARDEN GROW?

Choosing the fruits, vegetables and herbs to grow in your garden will depend on your garden site and design, what you and your family enjoy eating and whether or not you hope to preserve some of your harvest.

Knowing the type of soil in your garden site, the amount of light it receives each day, the amount of water it typically receives and the impact of prevailing winds will help you choose plants that will thrive in your unique site.

Determining the design of your garden will also help narrow down your plant selection. For example, vegetables that need to grow deep into the ground like carrots will not thrive in a shallow container and sprawling vines like watermelon will take up a great deal of space in a raised garden on a patio.

If you hope to preserve some of your harvest to enjoy through the winter, fruits, vegetables and herbs that can be frozen, dried or canned should be on your planting list. Blackberries, blueberries, currants, raspberries and strawberries are delicious dried, frozen or made into jam, asparagus, beans, carrots, corn, cucumbers, peas, peppers, squash, and tomatoes are favourites for freezing and canning, and most herbs can be dried.

You can increase the amount of produce you harvest by choosing varieties that mature at different times and implementing strategies like companion planting, consecutive planting and succession plantings.

COMPANION PLANTING:

When some fruits, vegetables and herbs are planted next to each other they provide benefits that include:

- i) **Support** — Plants can offer support and stability for another plant. Indigenous people planted The Three Sisters, maize/corn, squash and beans together with the corn offering a natural trellis for the beans to climb.
- ii) **Shelter** — Taller plants can offer shade and shelter from heavy rain and high winds, like the corn and climbing beans do for the squash in Three Sisters plantings.
- iii) **Pest control** — Nasturtiums, an edible flower, are often planted to attract aphids away from the fruit, vegetable and herb plants, while planting dill attracts ladybugs, which eat aphids, mites, white flies, and scale insects.
- iv) **Soil enhancement** — Some plants put nutrients back into the soil as they grow. Beans and peas use atmospheric nitrogen for their own growth and leave residual nitrogen in the soil that can be used by other crops.

There are many books and online resources that offer guidelines for companion planting.

CONSECUTIVE PLANTING:

You can increase the yield of your fruit, vegetable and herb garden by planting some crops in intervals. For example, you can extend the harvest of corn, lettuce, spinach, peas, etc. by planting seeds every 7 to 10 days through the early spring.

SUCCESSION PLANTING OR INTERCROPPING:

Another way to increase the productivity of your garden is through succession planting or intercropping. In succession planting early season crops are followed by long season crops, for example once lettuce has been harvested, summer squash can be grown in its place. In intercropping the seeds of early season, quick growing vegetables are planted at the same time with long season, slower growing plants, for example radish seeds are planted at the same time as cucumber. The radishes will have been picked before the cucumber plants reach full maturity.

Do It!

Activity: Make a garden plan

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Investigate ways to make gardening more accessible for seniors or those with physical challenges. Design an accessible garden that could be grown at a senior's or community centre.
2. Discover ways to reduce water use in the fruit, vegetable and herb garden. Design a "Water Wise" garden.
3. Create a list of plants that repel garden pest and those that attract beneficial insects.
4. Research a variety of approaches to growing food (for example, organic gardening, bio-dynamic gardening, and permaculture). Create a resource for the group comparing the different approaches.
5. Find out if your community has a Horticultural Society and attend a meeting (or two!). Horticultural Societies often host interesting speakers at their meetings, publish informative newsletters and offer Junior Gardeners' Programs. Some also maintain public gardens in the community, which is an excellent way to learn alongside more experienced gardeners.

ACTIVITIES:

ACTIVITY #1

EXAMINING SOIL TEXTURE

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Dry samples of sand, silt and clay soil (or similar); wet samples of the same soils; rolling pins; mats or tarps to protect surfaces; paper and pencil (optional) <p>Instructions:</p> <ol style="list-style-type: none">1. Give each individual or small group a sample, about the size of an egg, of the three types of dry soil without identifying them.2. Ask members to examine each sample and then try to make each sample into a ball and, if desired, record their findings.3. Give the members or groups a sample, about the size of an egg, of the three types of wet soil without identifying them.4. Ask members to once again try and make each sample into a ball and, if desired, record their findings.5. Ask members to try and roll each sample into a ribbon and, if desired, record their findings.6. Based on their results ask members to try and identify each soil sample and, if desired, share their results.7. Share properties of sand, silt and clay with the members...<ul style="list-style-type: none">– Properties of sand: Gritty, does not hold a ball shape, cannot be rolled into a ribbon– Properties of silt: Smooth, feels a bit like flour when dry, greasy when wet, will hold a ball shape, cannot be rolled into a ribbon– Properties of clay: Feels a bit gritty when dry, greasy when wet, sticky, has a shine when wet, will hold a ball shape and can be rolled into a ribbon8. If desired, have members combine all three samples together and repeat the ball and ribbon test.
REFLECT	<p>Learning Outcomes:</p> <p>Understanding the properties of sand, silt and clay soil.</p>

APPLY

Processing Prompts:

- Which soil do you think will hold water the best?
- Which soil do you think has the most air in it?
- Which soil do you think plants would prefer?

ACTIVITY #2
MAKE A RAIN GAUGE

<p style="text-align: center; font-size: 24pt; font-weight: bold;">DO</p>	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – One clear plastic container for each member; masking or duct tape; permanent markers; ruler; sand or pebbles; water <p>Instructions:</p> <ol style="list-style-type: none"> 1. Give each member a clear plastic container and enough sand or pebbles to cover the bottom to a depth of 2.5 centimetres (1 inch). 2. Have each member add water to the container until just barely above the sand or pebbles. 3. Have each member place the ruler vertically along the side of their container, with zero at the top of the water and then draw lines (either directly on the container or on a piece of tape) at 1 cm intervals up the side of the container. (Members can mark every number or go up by twos or fives.) 4. Members can place the rain gauges at their garden site to help determine when it is time to water their plants.
<p style="text-align: center; font-size: 24pt; font-weight: bold;">REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will be able to monitor the rainfall at their garden site.</p>
<p style="text-align: center; font-size: 24pt; font-weight: bold;">APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – How might a rain gauge help you grow produce? – What garden sites might need more water than the average (2.5 centimetres per week)? – What are some of the factors that influence how much water plants need?

ACTIVITY #3
MAKE A GARDEN PLAN

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Graph paper; pencil; ruler; Vegetable Garden Planting Guide; sample garden plans <p>Instructions:</p> <ol style="list-style-type: none">1. Draw a plan for your garden site, including location, design, and plant choices
REFLECT	<p>Learning Outcomes:</p> <p>Use knowledge about the growing needs of plants, garden design styles and planting strategies to create a plan for growing fruits, vegetables and/or herbs.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What are the advantages of making a garden plan before the growing season begins?– How does understanding the growing needs of plants help with planning a garden?– What challenges will plants face in your garden site?– How can you help plants thrive in your garden site?– What strategies can you use to increase the harvest from your garden?

WINTER - UNIT B: BUILD GARDEN STRUCTURES

SETTING OBJECTIVES:

Some garden plans require structures to support the growth of fruits, vegetables and herbs. Many of these structures can be built at home.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members are aware of the structures needed in their/the group's garden plan.
- Members can identify plants that need support in the garden.
- Members understand the needs of container grown plants.
- Members have built/helped to build a variety of garden structures.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Supporting plants with structures
- Preparing containers and raised beds for the growing season
- Windbreaks and reflective surfaces

ACTIVITIES:

1. Build a teepee trellis
2. Make a recycled/upcycled container
3. Make a 4-foot by 4-foot raised bed

Sample Meeting Agenda Time: 4 hours 30 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	What structures are needed in your garden? Supporting Plants	20 min
Activity	Activity #1: Build a teepee trellis	45 min
Topic Information	Containers	15 min
Activity	Activity #2: Make a recycled/upcycled container	30 min
Topic Information	Raised Beds	15 min
Activity	Activity #3: Make a 4-foot by 4-foot raised bed	90 min
Topic Information	Windbreaks Relative Surfaces	15 min
At Home Activities/ Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

WHAT STRUCTURES ARE NEEDED IN YOUR GARDEN PLAN?

Most gardens, large or small, require some kind of structures to support plant growth. Structures are also used to make gardening easier. For example, staking tomato plants makes them easier to prune and harvest and raised beds allow those unable to garden at ground level to enjoy growing their own produce.

Gardening in a windy or partially shaded area can also call for the addition of supportive structures. A wind break or reflective surface placed by the garden can increase plant productivity and boost your harvest.

SUPPORTING PLANTS:

There are a number of reasons to stake or support plants as they grow, including

1. to maximize space by growing plants vertically,
2. to encourage a more abundant crop and speed ripening,
3. to discourage disease by keeping foliage, fruits and vegetables off the ground, and
4. to make fruits and vegetables easier to find and pick.

Among the fruits and vegetables that appreciate a supportive structure are beans, blackberries, cucumbers, grapes, melons, peas, winter squash and tomatoes.

When you are designing and building structures keep in mind:

1. Sturdier is better. Plants may start small, but they grow and some crops are quite heavy by harvest time.
2. Install the support at the same time as you plant your seeds or seedlings.
3. Match the support to the plant's style of growth — climbing, clinging, winding, etc.
4. Use soft materials to attach the plant to the support (for example, strips of fabric or old nylon stockings) and tie in a figure eight — loop the tie around the support, cross the two ends, then loop around the plant stem and tie, leaving some slack so the stem can move and grow.
5. Make it user friendly with openings wide enough to reach through, materials that won't scratch or scrape your hands and arms, and dimensions that allow you to reach across or manoeuver around the full height and width.

Share It!

What structures have you included in your garden plan? (Could be a group or individual plan.)

Look it up!

Watch a video showing a variety of plant supports.

Do It!

Activity: Build a teepee trellis

CONTAINERS:

Almost anything can be used as a container for growing produce.



Before planting in any container, whether a traditional pot or something more unique, following these steps will ensure the best growing environment for your plants.

1. Make sure the container is not made from or covered with a harmful substance that could leach into the soil (for example lead paint, buckets that previously stored chemicals, chemically treated wood).
2. Clean the container thoroughly with a stiff brush, warm water and mild dish soap.
3. If it does not already have drainage holes in the bottom, drill at least four holes in the bottom of the container.
4. Use “soil” specifically designed for container gardening.
5. Decide what to plant in the container based on the space (height and width) the plants will occupy when fully grown.

Look it up!

Watch a video showing a variety of containers used to grow produce.

The holes at the bottom of the container ensure that the roots of the plant do not become waterlogged and the soil-less medium used for container gardens allows for the proper balance between moisture retention and drainage. Choosing a plant(s) that will have enough room for

their roots and foliage to be supported within the container will help keep your fruits, vegetable and herbs healthy.

RAISED BEDS:

In a location with good soil, creating a raised bed can be as simple as raking the existing soil into squares or rectangles surrounded by walking paths. To create a more permanent raised bed you can use straw bales, bricks, cement blocks, stones or wood to create a frame.

The height of your raised bed will depend on your garden site, the plants you intend to grow and your gardening needs and preferences. A raised bed can be as little as 15 centimetres (6 inches) off the ground or as much as 92 centimetres (36 inches) off the ground.

On a site with good soil you can fill a permanent raised bed by digging up the grass, removing weeds, working the soil and adding compost. Where existing soil is poor place a layer of cardboard, gravel, landscape fabric or newspaper at the bottom of the bed and then fill it with good quality soil and compost.

WINDBREAKS:

Creating windbreaks can protect plants, reduce their rate of transpiration and conserve soil. Balcony and rooftop gardens can often benefit from a windbreak.

Windbreaks can either be natural, like hedges and rows of trees, or manmade, like fences. Ideally a windbreak casts a minimum amount of shade while still filtering the wind. A windbreak will typically shelter an area behind it 10 to 15 times its height, for example a three metre (10 feet) tall windbreak will shelter an area 30 to 45 metres (100 to 150 feet) behind it.

You can build a windbreak out of snow fence, wire, plastic or fabric mesh, or wooden lattice. It can run the length of the garden site or be designed to protect specific areas. The idea is to slow the wind down, not block it entirely, so the windbreak should have as many gaps as it does solid material, approximately a 50-50 split.

Natural windbreaks can be constructed of permanent rows of trees and shrubs or temporary containers of plants positioned to protect the garden. Pots of evergreen shrubs, grasses and tall plants like lavender make effective, portable windbreaks. Fruit trees, either espaliered along a fence or planted in a row, and berry bushes can make an effective, edible windbreak in the garden.

Do It!

Activity: Make a recycled/upcycled container

Look it up!

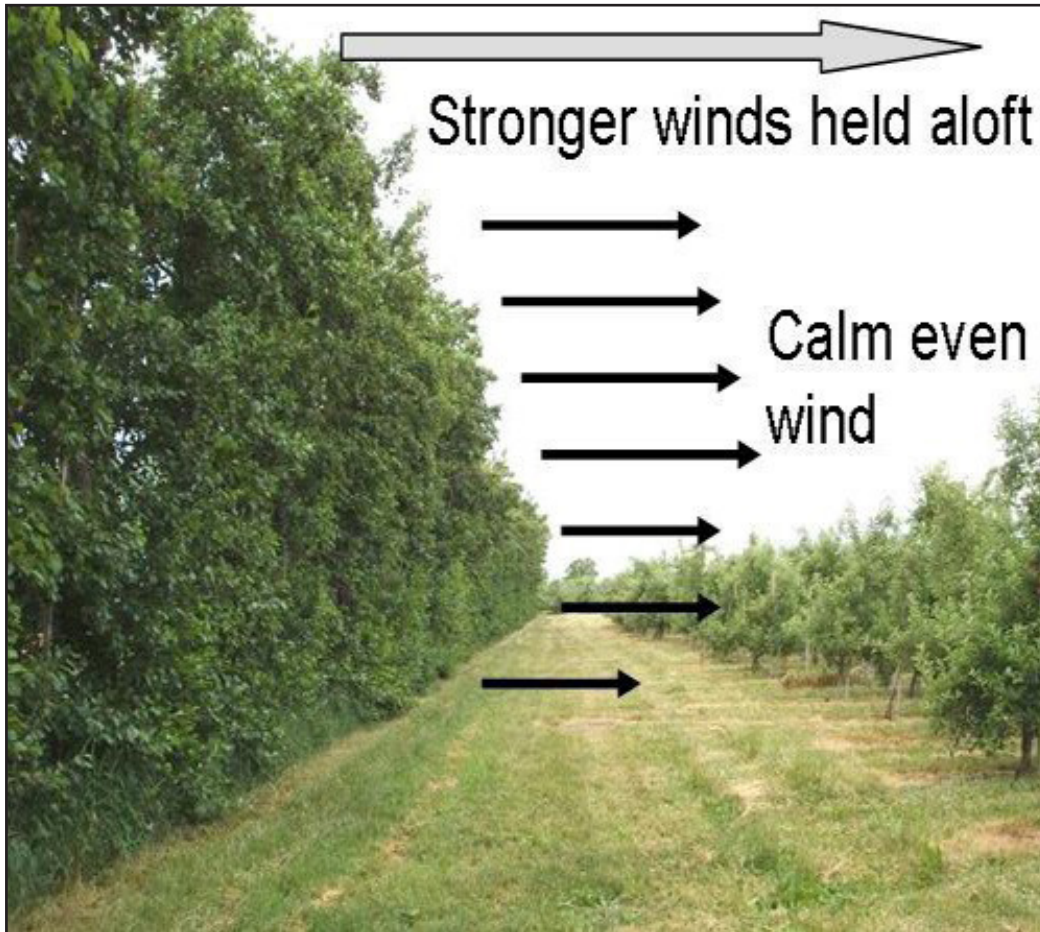
Watch a video showing the construction and preparation of a raised bed.

Do It!

Activity: Make a 4-foot by 4-foot raised bed

Look it up!

You can find detailed information about planting windbreaks (including several videos) on the Ontario Ministry of Agriculture, Food and Rural Affairs website <http://www.omafra.gov.on.ca/>



(<http://www.omafra.gov.on.ca/english/crops/hort/news/hortmatt/2014/11hrt14a4f1.jpg>)

REFLECTIVE SURFACES:

To boost the light in a partially shaded garden you can place light coloured stones or pavers where they will reflect the light into the garden. You can also paint fences or walls white to create larger reflective surfaces. Portable reflectors built from a piece of wood or plastic covered with aluminum foil or spray painted white or silver can be moved around the garden to benefit different crops as they grow.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Research windbreaks and design a windbreak for both a rural and urban garden site.
2. Research the best varieties of common fruits, vegetables and herbs for container planting and create a resource for the group.
3. Design and build a garden structure for your garden site.
4. Find out if your community has a Community Garden Network and attend a meeting. Learn about community gardens in your area and perhaps contribute to the creation of a new garden or garden structure to be used in the coming season.

ACTIVITIES:

ACTIVITY #1

BUILD A TEEPEE TRELIS

Adapted from: <https://www.quartoknows.com/blog/quartohomes/2015/04/24/how-to-build-a-simple-teepee-trellis/>

DO

Time: 45 minutes

Materials/Resources:

- Three 1-inch x 1-inch pieces of wood of equal length (approximately 152 to 182 centimetres, 5 to 6 feet); wire (approx. 18 gauge); 12 small screw eyes; drill (optional); pliers; screw driver; wire cutters; twine or cord; measuring tape; pencil; stool or small step ladder

Instructions:

1. Lay the three pieces of wood side by side on the ground.
2. Measure 60 centimetres (24 inches) from one end on each pole and mark. Measure and make another mark 60 centimetres (24 inches) above the first mark. Drill pilot holes at each mark (optional). (Holes could be pre-drilled.)
3. Insert screw eyes at each mark/into each pilot hole (total of six screw eyes, two on each pole, 60 and 120 centimetres (24 and 48 inches) from base.
4. Turn all three poles the same direction, so the screw eyes are all lying parallel to the ground and facing the same direction, and repeat instructions 2 and 3 on the adjacent side.
5. Stand the poles up and arrange them into a loose teepee shape. The screw eyes on each pole should be facing each other on the inside edges of the poles. Bind the tops of the three poles together with twine or cord.
6. Wrap wire around one screw eye, twisting tight with the pliers. Stretch the wire to the screw eye at the same level on the next pole, clip wire and twist securely with the pliers. Repeat for remaining screw eye pairs at the 60 cm (24") and 120 cm (48") levels. (Wire lengths could be pre-cut.)
7. At planting time, push the feet of the trellis firmly into the ground around the plant it will support.

REFLECT	Learning Outcomes: Learning basic building techniques and methods to support growing plants.
APPLY	Processing Prompts: <ul style="list-style-type: none">– What other materials could be used to build a teepee trellis?– What plants will grow best in the teepee trellis?– Why is the teepee/triangle a strong structure to support plants?– How could we make this teepee trellis stronger?

ACTIVITY #2
MAKE A RECYCLED/UPCYCLED CONTAINER

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – One recycled/upcycled container for each member; drill; drill bits suitable for a variety of materials; soil-less medium (optional); water (optional); scale (optional) <p>Instructions:</p> <ol style="list-style-type: none"> 1. Have members source and bring a clean recycled or upcycled container to the meeting that they would like to use in their garden plan. (Examples include old buckets, baskets, boots, empty plastic soda or water bottles, old coffee or tea pots, etc.) 2. Drill at least four holes in the bottom of each container. 3. (Optional) Fill container with good quality potting soil so that it is ready for planting. If members will be gardening on a balcony or rooftop soak container thoroughly and weigh.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will have a unique container for their garden site and understand the importance of drainage and plant selection in container gardening.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Why do the containers need holes in the bottom? – What plants do you think will grow best in your container? Why? – Why is it important to use potting “soil” in containers?

**ACTIVITY #3:
BUILD A 4-FOOT BY 4-FOOT RAISED BED**

<p style="text-align: center; font-size: 2em; color: white;">DO</p>	<p>Time: 90 minutes</p> <p>Materials/Resources: Eight 2-inch x 6-inch x 4-foot untreated boards; four 4-inch x 4-inch x 15-inch posts; 48 3.5-inch deck screws; drill; screwdrivers</p> <p>Instructions:</p> <ol style="list-style-type: none"> 1. Screw one 2-inch x 6-inch board onto one of the posts, keeping it square with the top and side of the post. Attach another post to the other end of the board, again keeping it flush with the top and side. 2. Attach a second 2-inch x 6-inch board to the posts below the first, keeping the boards as close together as possible. 3. Repeat Steps 1 and 2 with two more boards and the other two posts. 4. Close the square with the remaining boards. You may find it easiest to lay the structure upside down on a flat surface to keep it level. 5. Upon completion you should have a square with four posts that can be dug into the ground to keep the structure from moving. 6. Place your raised bed at your garden site and fill it with the best possible soil. .
<p style="text-align: center; font-size: 2em; color: white;">REFLECT</p>	<p>Learning Outcomes: Understand basic building techniques and how to prepare a raised bed for planting.</p>
<p style="text-align: center; font-size: 2em; color: white;">APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – What are some advantages of a raised bed garden? – In what circumstances is raised bed gardening an excellent choice? – What other materials could be used to build a raised bed?

WINTER - UNIT C: MAKE COMPOST

SETTING OBJECTIVES:

Making compost diverts kitchen scraps and garden waste from the landfill and creates an excellent fertilizer for soil, improving aeration and drainage while adding valuable nutrients. Understanding the principles of composting will allow you to enhance your soil with homemade compost.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members are aware of the benefits of composting.
- Members understand the ingredients needed for a successful composting system.
- Members have explored a variety of composting techniques.
- Members have built/helped to build a composting system.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Compost: what it is, benefits, basic ingredients
- How to make compost outdoors and indoors
- Vermicomposting

ACTIVITIES:

1. Build a compost bin from pallets
2. Make an indoor compost bin
3. Make a single bin vermicomposting system

Sample Meeting Agenda Time: 3 hours 45 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	What is compost? What are the benefits of composting? How do you make compost? Starting an outdoor compost system	30 min
Activity	Activity #1: Build a compost bin from pallets	60 min
Topic Information	Starting an indoor compost system	20 min
Activity	Activity #2: Make an indoor compost bin	30 min
Activity	Activity #3: Make a single bin vermicomposting system	45 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

WHAT IS COMPOST?

Compost is a mixture of decaying organic material that can be used to improve the structure of soil and provide nutrients to plants. The organic material is broken down by bacteria and other organisms into a dark, crumbly material known as humus.

WHAT ARE THE BENEFITS OF COMPOSTING?

Composting kitchen scraps and garden waste diverts these items from the landfill and the resulting humus can enrich almost every type of soil. Compost improves soil structure and texture, enabling the soil to retain more moisture, air and nutrients. Adding compost to soil also helps to suppress plant diseases and pests and reduces the need for chemical fertilizers.



Compost can also be used to top dress gardens, helping to keep weeds in check and reduce moisture loss.

HOW DO YOU MAKE COMPOST?

There are a variety of composting methods, but the basic recipe is:

- A container
- Layers of brown (carbon rich) and green (nitrogen rich) material
- Water to keep it moist (but not soggy)
- An occasional turn or stir to aerate

Brown material (carbon rich) for the compost pile includes branches, fallen (dry) leaves, hay, peanut shells, pine needles, sawdust, shredded cardboard and paper, straw, twigs, and woodchips.

Green material (nitrogen rich) for the compost pile includes coffee and tea grounds, fresh grass clippings, fruit scraps, healthy plants and plant cuttings, seaweed/lake weeds, and vegetable waste.

Materials to keep out of the compost pile include black walnut tree leaves or twigs, bones, cat litter, charcoal and briquettes, cooked food waste, dairy products, diseased/insect ridden plants, fats/grease/lard/oils, fish scraps, glossy paper, meat, peanut butter, pet wastes, and yard trimmings treated with pesticides.

Look it up!
Watch a video about
composting.

STARTING AN OUTDOOR COMPOST SYSTEM

All of the items in the list of brown and green materials would eventually decompose if left out in the elements. A well-built compost pile is designed to speed up that process by creating the right balance of air, heat and moisture.

1) LOCATION

An outdoor compost pile should be located on level ground with good drainage. It can be located in the shade or where it receives sun for part of the day.

The pile should be in an easily accessible location, not so far away from the kitchen that dumping scraps requires hiking boots, and not too far away from a water source.

Do not place the pile right up against a wooden building, fence or tree because it will cause the wood to rot. Do not place it under an eave that will limit rainfall or under a downspout that will leave it saturated.

2) SIZE

The ideal size for a compost pile is between 90 centimetres (36 inches) and 180 centimetres (72 inches) square. A smaller compost pile may not maintain the proper temperature (40 to 60 degrees Celsius) for efficient decomposition and a larger pile may not receive enough air.

3) CONTAINER

There are a wide variety of compost containers for sale at hardware and garden centres, but it is easy to build one.

Do It!
Activity: Build a compost bin out of recycled pallets.

4) TOOLS

There are a few tools which make composting easier, including a covered container in the kitchen to collect scraps and transport them to the compost pile, a four or five-tined pitch fork for turning the pile, and a garden hose or watering can.

While not necessities, a pruner or shredder to chop up the organic waste into small pieces and a compost thermometer to monitor the temperature of the pile may be useful.

An alternative to both the thermometer and pitch fork is a metal pole inserted in the centre of the compost pile. Feeling the temperature of the pole will give you an idea of the temperature of the pile and it can be used to regularly churn the pile.

5) LAYERING

Your compost pile will have the best possible start if you build it in layers. Once the pile is established layering is not so essential as materials can be buried in the centre of the pile or incorporated when the pile is turned.

Base layer: Relatively large materials like branches and twigs, chopped up corn cobs and corn stalks work well on the bottom of the compost pile. As the pile settles these bulkier items allow for greater air circulation.

Alternating brown (carbon rich) and green (nitrogen rich) layers: Often the bulkier items on the bottom are brown materials, so the second layer would be a green, the third brown, and so on. Each layer should be approximately 15 to 20 centimetres (6 to 8 inches) deep. Lightly water and firm each layer as you add it, but do not compact the pile.



6) TURNING AND WATERING

Once the pile starts to heat up it is time to turn it. To maintain the fastest possible decomposition rate it is necessary to turn the pile every two or three days, adding water to maintain the moisture content at approximately 50 per cent. You can check the moisture content of the compost pile by squeezing a handful. It should feel damp to the touch, but you should only be able to squeeze out a drop or two of water.

Turning and watering the pile less often, every five or six weeks, will still create compost, just at a slower rate.

Through the winter the compost pile will essentially be dormant. If your container does not have a lid, covering it with a tarp will help retain some heat and keep it from getting too wet. Just put kitchen scraps on top of the pile and turn it in the spring once things start to heat up again.

7) AN OUTDOOR ALTERNATIVE — TRENCH COMPOSTING

Bury 10 to 15 centimetres (4 to 6 inches) of kitchen scraps in a trench approximately 30 centimetres (12 inches) deep and cover with the soil that came out of the trench. Depending on the composition of the kitchen scraps and the time of year, decomposition will occur in one month to one year. You can trench compost in a particular area of the garden each year, trench compost between rows of plants, or simply trench compost wherever there is space.

STARTING AN INDOOR COMPOST SYSTEM

An indoor compost system performs the same function as the outdoor pile, but on a smaller scale.

1) LOCATION

Place your indoor compost system where it is convenient to use, but out of the reach of small children and pets.

2) CONTAINER STYLE AND SIZE

The size and style of your compost system will depend on how much room you have available and the quantity of kitchen scraps your family produces. A covered container between 45 and 120 litres (10 and 30 gallons) works for most families.

As with outdoor containers, there are a wide variety of indoor compost systems for sale at hardware and garden centres, but they are also easy to build yourself.

Do It!

Activity: Make your own indoor compost bin.

3) LAYERING, TURNING AND WATERING

Just like in the outdoor pile, an indoor compost system will work best if it is built in layers, alternating brown (carbon rich) and green materials (nitrogen rich). Shredded paper (not glossy) works well as the brown layer for indoor bins and adding a scoop of soil with the brown layer also speeds up the process. It is not usually necessary to add water, but turning the pile, either with trowel or by rolling the container around occasionally is recommended.

4) AN INDOOR ALTERNATIVE — VERMICOMPOSTING

An alternative to an indoor compost bin is a vermicomposting or worm composting system. When earthworms eat kitchen scraps they excrete casts, which are dark, odorless, nutrient-rich granules that are an excellent soil conditioner.

As with all composting systems, there are many worm bins available to purchase but they are easy to build. You can make them out of wood or use a plastic bin, aiming for a space approximately 30 to 60 centimetres (12 to 24 inches) deep and 60 to 90 centimetres (24 to 36 inches) square. Bins should be placed in a location where the temperature remains between 0 and 35 degrees Celsius (25 degrees Celsius is ideal).

Once you have your worm bin, you need worms. The best worms for vermicomposting are red wigglers (*Eisenia foetida*) and 500 grams (1 pound) of worms will get most indoor worm bins off to a good start. The worm population will double in approximately 60 days. You can order worms online or get them from an established vermicomposting system in your community.

Do It!

Activity: Make your own vermicomposting bin.

The worms need a comfortable home before they can digest kitchen scraps and you can provide this with approximately eight centimetres (3 inches) of shredded cardboard or paper and a shovel-full of soil, either potting or garden soil, moistened with water. The bedding should

feel like a damp sponge, but you should not be able to squeeze water out of it. Introduce your worms to their new home and allow them a day to get acclimated before you start feeding them.

Worms will eat fruit and vegetable waste, bread, pasta, coffee and tea grounds, and cereal. Start by feeding the worms once a week and



keep an eye on what foods they are not eating. Worms may have trouble with too much citrus fruit, onion skins and garlic. Using a trowel, carefully make a small hole, throw a handful of shredded paper in the hole and then place the kitchen scraps on top. Cover all the food scraps with bedding. If the bin gets too wet add more shredded paper.

Once the bedding and compost reach a depth of approximately 30 centimetres (12 inches) it is time to harvest the compost. In a single bin system, push the existing bedding over to one side of the bin and put fresh bedding and kitchen scraps on the empty side. In a double bin system place the second bin on top of the first with fresh bedding and kitchen scraps. Wait for about one week to give the worms time to move to the fresh bedding/new bin and then remove the finished compost.

If any of the worms try and escape the worm bin, it is an indication that something is wrong with their environment. Make sure their needs for temperature, air, water and food are being met. Odor can also indicate an imbalance in the worm's environment, often too much moisture or bedding/compost that is too deep.

Experience it!

Visit a local composting system (residential, commercial or industrial) or invite a local expert to speak.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Research industrial and commercial composting systems. How are they similar to and/or different from household systems?
2. Research new products available for household composting. What innovations are taking place in composting?
3. Design and build your own unique composting system.

ACTIVITIES:

ACTIVITY #1

BUILD A COMPOST BIN FROM PALLETS

DO

Time: 60 minutes

Materials/Resources:

- Four clean wooden shipping pallets; wire, wire cutters and pliers OR six L-brackets and screws; two or three hinges and screws; drill; screwdriver; gate latch and screws
- Optional: Outdoor paint or stain and paintbrush; burlap or landscaping fabric; staple gun; scissors; potting soil; plants

Instructions:

1. Choose your layout. Decide which direction the pallets will face and whether they will stand tall, wide or a combination.
2. Connect two pallets together from the inside with L-brackets and screws OR wire them together.
3. Attach a third pallet to the first two (using the same method as in step two), making a three-sided box.
4. Attach hinges to one edge of the remaining pallet and then attach to the three-sided square to make a door for the compost bin (the door will swing out).

Optional:

1. Stain or paint the outside of the compost bin (don't paint the inside, if the paint or stain flakes it will end up in the compost).
2. On each side of the bin where you would like to grow plants, cut a piece of burlap or landscape fabric the full length of the pallet with 30 centimetres (12 inches) of fabric hanging down on either side (inside and outside) of the compost bin.
3. Cut a notch in the fabric where there are braces on the pallet and then staple the fabric all along the inside edge of the pallet's top front slat while the fabric hangs down the front of the compost bin. Tuck the fabric down in between the front and back slats of the pallet (giving a tidy edge at the front) and then over the back slat and staple all along the edge of the inside of the bin to make a pocket to hold soil. Trim any excess fabric with scissors.
4. Put potting soil in each pocket and fill with your choice of plants. Water thoroughly.

REFLECT	Learning Outcomes: Learn basic building techniques and gain an understanding of composting methods.
APPLY	Processing Prompts: <ul style="list-style-type: none">– What other materials could be used to build an outdoor compost bin?– What size compost pile will this bin support?– Are there any ways this design could be improved?

ACTIVITY #2
MAKE AN INDOOR COMPOST BIN

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <p>One clean 45 to 120 litre (10 to 30 gallon) container with a lid (for the group or for each member) either plastic or metal; a second lid or tray that fits under the container; drill; bungee cord or clamps (optional)</p> <p>Instructions:</p> <ol style="list-style-type: none"> 1. Drill holes, approximately 5 centimetres (2 inches) apart, in the bottom and around the top rim of the container for ventilation. 2. Put a thin layer of shredded newspaper and soil in the bottom of the compost bin and set on the spare lid or tray. The spare lid or tray can be lined with newspaper if desired. 3. To make a compost bin that can be rolled, if there are handles on the container stretch a bungee cord from one handle to another, if there are no handles use strong clamps to hold the lid securely and roll it weekly. If the compost bin will not be rolled, give it a stir or shake every few days.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will have an indoor composting bin to use at meetings/home and an understanding of composting methods.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Why do the containers need holes in the bottom? – Why is it necessary to roll or stir the compost? – What are the ingredients for a successful compost system?

ACTIVITY #3

MAKE A SINGLE BIN VERMICOMPOSTING SYSTEM

Adapted from: <https://www.epa.gov/recycle/how-create-and-maintain-indoor-worm-composting-bin>

<p style="text-align: center; font-size: 2em; font-weight: bold;">DO</p>	<p>Time: 45 minutes</p> <p>Materials/Resources:</p> <p>Two plastic bins: a shallow one for the base and a taller one with a lid that will sit in the base; drill with 1-inch and 1/8-inch bits; non-metal screening material; waterproof glue; shredded paper; soil; water; 500 grams (1 pound) of red wiggler worms; trowel; food scraps container</p> <p>Instructions:</p> <ol style="list-style-type: none">1. Drill a 1-inch hole about 5 centimetres (2 inches) from the top on one side of the taller bin. Drill another 1-inch hole on the opposite side of the same bin. These holes allow air into the bin for the worms to breathe.2. Drill one 1/8-inch hole near each bottom corner of the same bin. These holes allow excess liquid to drain out of the bottom of the bin so the worms do not drown.3. Cover each of the holes with the screening and glue in place with the waterproof glue. Allow the glue to dry completely before adding bedding to the bin.4. Place the tall bin inside the shallow bin. Do not drill any holes in the shallow bin!5. Make worm bedding by combining shredded cardboard or paper, a scoop of soil and enough water to make everything very moist, without creating puddles of water. Put the moist bedding in the tall bin to a depth of about 8 centimetres (3 inches).6. Place your worms in the bedding and put the lid on the bin. Give the worms a day to get used to their new home.7. Feed your worms with kitchen scraps by gently making a small hole in the bedding, dropping in a handful of shredded paper and the kitchen scraps, and then gently covering the scraps over with bedding. Watch the worms go to work!
<p style="text-align: center; font-size: 2em; font-weight: bold;">REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will have a vermicomposting bin to use at meetings/home and will understand how to build and maintain a vermicomposting system.</p>

APPLY

Processing Prompts:

- What do worms need in order to make kitchen scraps into casts?
- Could the worm bin be kept outside?
- What kitchen scraps do worms eat/not eat?

SPRING - UNIT D: STARTING SEEDS

SETTING OBJECTIVES:

To successfully grow your own fruits, vegetables and herbs it is important to know what each plant needs to grow and thrive, starting from when they are just seeds. Knowing when to plant seeds and how to care for seedlings, both indoors and outdoors, will help members:

- Produce a variety of healthy seedlings
- Ensure their produce gets off to the best possible start

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members understand that each seed has slightly different growing needs.
- Members can determine optimal planting times and conditions for different seed varieties.
- Members understand the essential elements required for starting seeds indoors and out: healthy soil, adequate water and light.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Climate and plant hardiness zones
- Soil temperature and germination
- Days to maturity
- Planting and caring for seedlings
- Direct sowing into the garden
- Planting fruit bushes and trees

ACTIVITIES:

1. Take the Soil's Temperature
2. Seed or Seedling? Worksheet
3. Mystery Seeds

Sample Meeting Agenda Time: 3 hours 20 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Seed or Seedling Climate Zone Soil Temperature	20 min
Activity	Activity #1: Take the Soil's Temperature	30 min
Topic Information	Days to Maturity	10 min
Activity	Activity #2: Seed or Seedling? Worksheet	30 min
Topic Information	Seedlings Seeds	30 min
Activity	Activity #3: Mystery Seeds	30 min
Topic Information	Perennial Crops	10 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

SEED OR SEEDLING?

There are a variety of factors that determine whether seeds benefit from being sown directly into the garden or planted as seedlings, including...

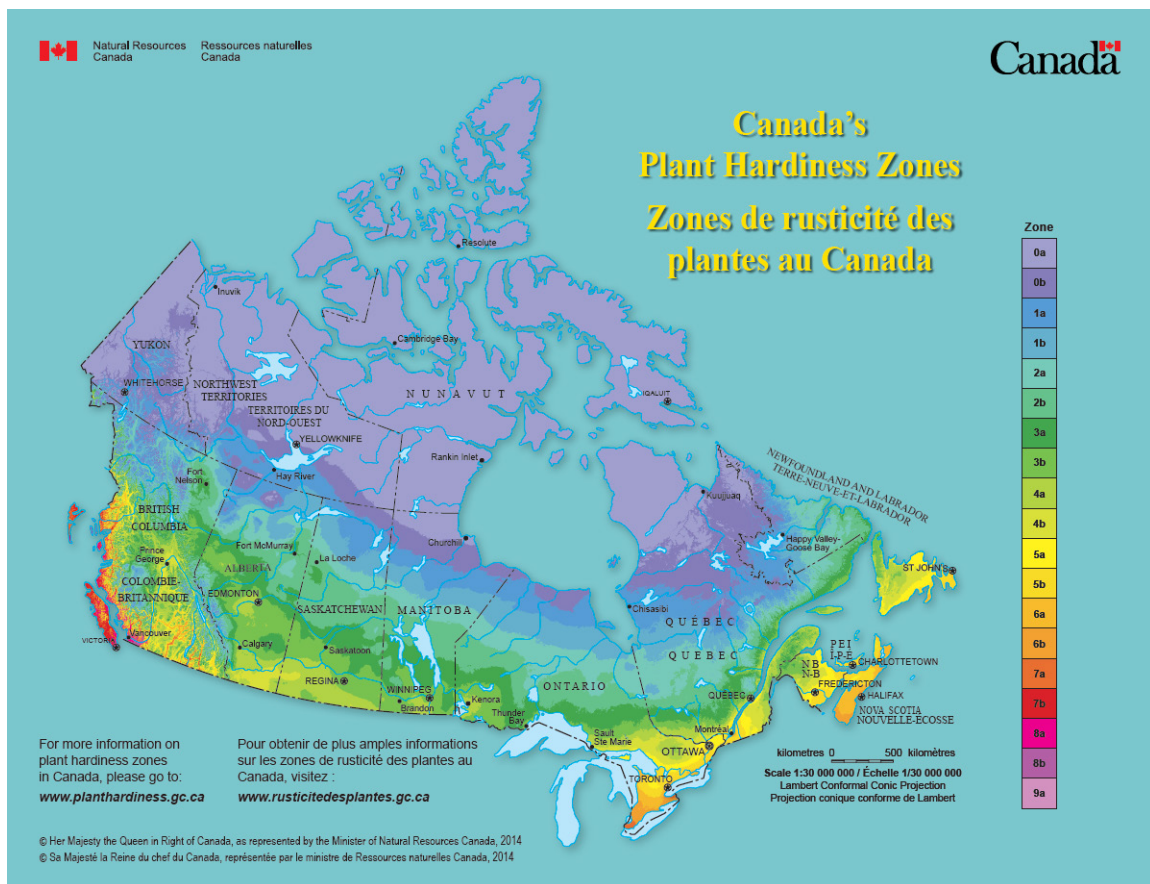
1. The climate and plant hardiness zone of your garden site
2. The optimum soil temperature for germination of your chosen seeds
3. The number of days to maturity for your chosen seeds

CLIMATE ZONE

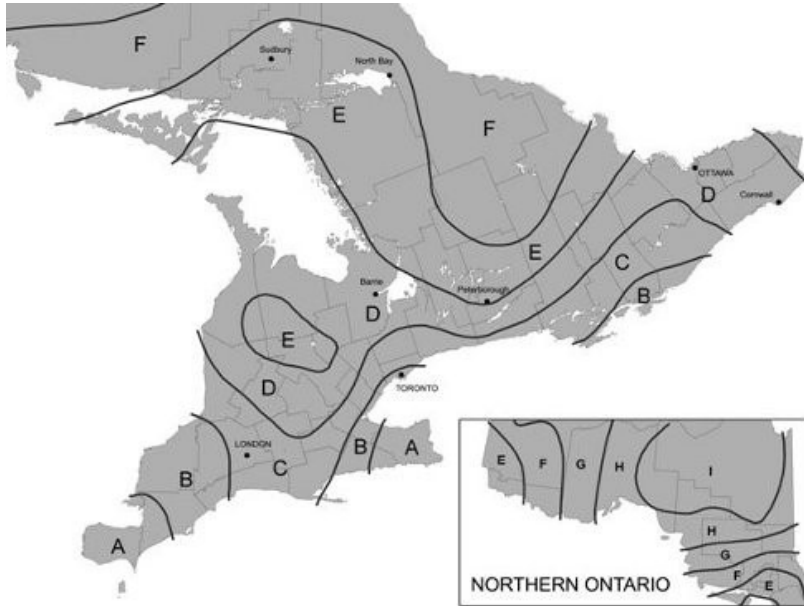
Knowing the climate and plant hardiness zone of your garden site gives you a variety of helpful information. Plant hardiness zones are based on seven factors that reflect the temperature, frost free period, precipitation and wind gusts in each area. There are currently 19 plant hardiness zones in Canada, ranging from 0 and 0a to 9a.

Look it up!

Check the zone for your municipality at <http://www.planthardiness.gc.ca>



Climate Zone Maps created by the Ontario Ministry of Agriculture Food and Rural Affairs are based on the average frost-free period for each area.



Look it up!
 Find your area's climate zone at <http://www.omafra.gov.on.ca/english/crops/facts/climzoneveg.htm>

Knowing which zone your garden site is in will tell you how early you can start planting and how long you can expect the growing season to last.

SOIL TEMPERATURE

All plants have both a minimum soil temperature that they will tolerate and an ideal soil temperature for germination. Garden sites within the same plant hardiness and climate zone will warm up at different rates depending on the soil cover (for example, straw-covered or bare), location (south facing sites warm more quickly), moisture level (dry soils warm faster than wet ones) and whether it is at ground level or above (raised beds warm faster). During the early weeks of the growing season soil will also be warmer during the heat of the day than it is at night.

Do It!
 Activity: Take the soil temperature in your garden site

You can estimate the temperature of your garden soil by digging up a handful or you can use a soil thermometer for a more accurate measurement.

DAYS TO MATURITY

Once the seeds have germinated, or started to sprout, every plant has a certain number of days to maturity, or the point at which you will be able to harvest the crop. The days to maturity for each crop span a range, for example 50 to 70 days, when gardeners can expect crops to be ready to harvest, depending on growing conditions. Specific information about the seeds you have chosen will be written on the seed packet and general information for many crops is listed on the Vegetable Garden Planting Guide (found in the next section).

Once you know which zone your garden site is in, the preferred soil temperature each of your chosen crops needs to germinate, and the length of time they will take to reach maturity you can decide whether to plant seeds directly in the garden or give them a head start by planting them indoors.

For example, spinach prefers a soil temperature between 4 and 8 degrees Celsius and will be ready to harvest in 45 to 70 days, depending on the variety. If your garden site is in Climate Zone E, you can expect between 125 and 145 frost free days. Since you can plant spinach when

the soil is still quite cool, even before the average date of the last spring frost, you can plant its seeds directly into the garden. There is no need to grow seedlings indoors. Muskmelon or cantaloupe, on the other hand, prefers a soil temperature between 24 and 29 degrees Celsius to germinate and takes 65 to 100 days to mature so it needs to be planted and grown indoors for several weeks in order to have enough time to produce a harvest.

Do It!

Activity: Seed or Seedling?

SEEDLINGS

If you have determined that the plants on your list will need a head start on the growing season you have two choices. Seedlings can be purchased from reputable growers or you can grow them yourself.

To grow your own seedlings you will need:

1. Containers
2. Potting “soil”
3. Seeds
4. Water
5. Light and warmth
6. Fertilizer and maintenance
7. Time to harden off the seedlings

1) CONTAINERS

Start your seeds in small, individual containers. You can use trays designed specifically for starting seedlings or repurpose egg cartons or yogurt cups. Clean any old bedding trays or repurposed pots with a mixture of one part bleach to 10 parts water.

You can also make pots from strips of newspaper which can go directly into the garden. Paper or fiber pots that will break down in the soil are especially good for plants like cucumbers, squash, pumpkins and melons that do not like to have their roots disturbed.

Place all of your seedling pots in a larger tray or container that is easy to move around and can collect any excess water.

2) POTTING “SOIL”

Use a soil-less seed starting mix to plant your seedlings. Potting “soil” designed for seed starting is sterile, lightweight and free from weed seeds, with a fluffy texture ideal for germinating seeds.

Break up the potting “soil” and wet it before putting it into your containers. It should be wet to touch, but not so wet that you can squeeze water out of it. Fill the containers about 2/3 full and tap them on a table or hard surface to help the potting mix settle. Add more potting mix until the pots are nearly full. Gently firm each pot with your hand or a small board.

3) SEEDS

Sow each seed according to the directions on its packet. If you are unsure about how deep to sow the seed a general rule of thumb is to plant a seed four times as deep as its width, but it is better to err on the side of shallow planting. Plant at least three seeds in each container because not all of the seeds will germinate, and not all sprouts will survive. You can always thin the seedlings out later. Clearly mark the type of seed in each pot.

Some seeds, like lettuce, need light to germinate. Barely cover them with potting “soil”. Other seeds can be covered with clear plastic or several layers of newspaper (to help preserve heat and moisture) until they sprout. All varieties should be placed in a warm, draft free location and checked on daily.

4) WATER

Keep the potting mix moist while the seeds are germinating. A spray bottle is a gentle way to water. Drain off any excess water that accumulates under the pots.

Once the seedlings start to grow be careful not to overwater them. Allow the surface of the soil to dry between each watering.

5) LIGHT AND WARMTH

Most seeds germinate best in a soil temperature around 20 degrees Celsius. Keep in mind that the potting “soil” will be cooler than the temperature in your house. You can warm the soil by placing your tray on the top of your refrigerator or by using heating mats designed for starting seedlings. Heating mats warm the soil from below.

Once your seedlings poke through the soil, remove the plastic or newspaper and place them in indirect light with good air flow. When they have one or two leaf-like structures (the cotyledon) it is time to place them under a light source. Seedlings need between 12 and 16 hours of light. If your sunniest window will not provide enough light you can use fluorescent lights. You can purchase specially made grow lights or use cool-white fluorescent bulbs. The lights should be positioned no more than four inches above the seedlings. Hanging lights on chains that can be raised up and down makes it easier to adjust their height as the seedlings grow.

Look it up!

Watch a video about seed germination.



6) FERTILIZER AND MAINTENANCE

Once the seedlings have several sets of true leaves they will need an application of water soluble balanced fertilizer or rooting fertilizer (rich in nitrogen and potassium), diluted to one-quarter strength, once a week.

If your seedlings outgrow their starter pots you can carefully move them into a larger pot. Hold them gently by the root ball, not the stem, during the transplanting process. If more than one seedling germinates you can thin them by clipping the smallest or least vigorous plant(s) off at the soil with a pair of scissors. Do not pull extra seedlings out of the pot because the roots of all the seedlings could be wound together below the soil.



7) HARDENING OFF

Plants that have been grown indoors have been protected from temperature fluctuations and the intensity of the sun, wind, and rain. Before they move outdoors full time they need a few weeks of transition time.

Start by putting them outside in a shady, protected spot during

the warmest part of the day. Bring them back inside at night before temperatures start to drop. Gradually increase the length of time the plants are spending outside and the amount of sun they are exposed to. After two weeks the plants should be ready to stay outdoors until you are ready to put them in the garden.

When you are ready to plant them in the garden give them one last watering in their pots and try to choose a cloudy afternoon. Dig a hole as deep and a little wider than the pot, tip the seedlings gently out of their pot, holding them by the root ball and not the stem, give the roots a bit of a fluff and then place them in the hole. Fill in the hole and gently firm the soil around the seedling and its plant marker. Finally, water the seedling in its new home.

Experience it!

Visit a plant nursery to see how professional growers start their seeds and care for their seedlings.

If your seedlings are in fiber or paper pots, trim the pots down below the soil and tear off their bottom to encourage the roots to spread out into the garden soil.

SEEDS

If your chosen plants can be planted directly in the garden, follow the directions on each seed packet. Make a furrow or hole with a hoe, trowel or by hand. Place the seeds the required depth and distance apart following your garden plan and then cover with soil, tamp lightly, place a marker and water generously.

Do It!

Activity: Mystery Seeds

PERENNIAL CROPS

Some parts of your garden plan may require neither seeds nor seedlings. Berry bushes like raspberries, blackberries and blueberries, fruit trees like apples, pears and cherries, and crops like asparagus and rhubarb are planted as one or two-year-old plants. You can purchase asparagus and rhubarb crowns, fruit bushes and trees from reputable growers.

Most fruit bushes and trees should be planted as soon as the soil can be worked in the spring, while a few prefer to be planted in the fall. Rhubarb crowns can also be planted as soon as soil can be worked, but you should wait to plant asparagus until all risk of frost has passed. You can find information about the care and planting of a variety of fruit and perennial crops on the Ontario Ministry of Agriculture Food and Rural Affairs website <http://www.omafra.gov.on.ca>.



Most berry bushes, asparagus and rhubarb take one or two years before they produce their first crop and fruit trees take three to five years, depending on the size of the tree. A dwarf tree will begin producing fruit three or four years after it is planted, and dwarf or compact-growth trees are the ones most often grown in home gardens because they are easier to pick from, prune, spray and produce fruit earlier than a standard-sized tree.

and the rootstock. The scion is the above-ground part of the tree that will produce the fruit and the rootstock is the base. The rootstock determines the size of the tree. The scion determines the cultivar or variety of fruit, for example a Gala, McIntosh or Delicious apple.

Make sure your garden plan takes into consideration the mature size of perennial crops, especially fruit bushes and trees. Allow enough room for the tree to grow to its full height, especially if it will be planted near a building or fence.

Fruit trees consist of two parts, the scion (pronounced sigh-on)

Experience it!

Visit an orchard, invite an expert to speak, or watch a video to see how scions are grafted onto rootstocks.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Choose a crop that needs a head start on the growing season and grow enough seedlings for each member of the group, or for the group's collective garden.
2. Research the budding and grafting of fruit trees. Bud or graft your own fruit tree(s). Record the techniques you used, the fruits involved, the dates and success of each bud or graft. Do at least five buds or grafts (they may involve the same fruit).

OR Research the grafting of tomato plants. Graft your own tomato plant. Record the techniques used, the varieties involved (both scion and rootstock), the dates and success of each graft. Do at least five grafts (they may involve the same varieties).

3. Research food forestry. Design a food forest that could be planted in your community.

ACTIVITIES:

ACTIVITY #1

TAKE THE SOIL'S TEMPERATURE

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Soil/garden thermometer (meat thermometer which measures down to 0 Celsius will also work); thin wooden skewer marked at 5 and 10 centimetres from one end; clipboard; paper; pencil (additional supplies to allow members to work as individuals or small groups) <p>Instructions:</p> <ol style="list-style-type: none">1. Measure the air temperature and the temperature at ground level. Note any difference.2. Take the soil temperature in a variety of locations (for example under a shady tree, in a sunny location, in a wet location, etc.)3. To take the soil temperature, make a hole in the ground with the skewer to the 5 centimetre depth. Insert the thermometer in the hole, no deeper than the skewer went, and leave for one minute. Remove the thermometer and quickly record the soil temperature. Repeat at a depth of 10 centimetres.4. Move to a new location and repeat Step 3.5. Compare data. If possible, repeat the measurements in the same locations at a different time of day (i.e. early in the morning, after dark).
REFLECT	<p>Learning Outcomes:</p> <p>Understanding the impact of environmental conditions (sun, moisture, etc.) on soil temperature and the importance of soil temperature on seed germination.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– At what depth was the soil warmest? Coolest? Why?– At which location was the soil warmest? Coolest? Why?– What crops could be planted in the soil today?

ACTIVITY #2
SEED OR SEEDLING? WORKSHEET

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– “Seed or Seedling?” worksheet; previously completed garden site plans; Vegetable Garden Planning Guide and/or seed packets; pencil for each member/garden plan <p>Instructions:</p> <ol style="list-style-type: none">1. Give each member a copy of the “Seed or Seedling?” worksheet.2. Have each member use the information from their previously completed garden plan along with the Vegetable Garden Planning Guide and/or seed packets to complete the “Seed or Seedling?” Worksheet, determining the dates to either direct sow seeds or start seedlings indoors. Share information if desired.
REFLECT	<p>Learning Outcomes:</p> <p>Members will know when to plant seeds and/or start seedlings for their garden plan.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What is the earliest date you hope to plant seeds in your garden site? To start seedlings?– What is average soil temperature for germination in your garden plan?– What is the average number of days to maturity in your garden plan? How will this impact your harvest?– Are there some fruits, vegetables and herbs that can be either direct sown or started as seedlings? How did you choose the seeding method for your garden site?

SEED OR SEEDLING?

Climate zone of your garden site: _____

Plant hardiness zone of your garden site: _____

Crop Name	Soil Temperature for Germination	Days to Maturity	Direct Seed on... (date)	Subsequent Direct Seeding on...(date)

ACTIVITY #3
MYSTERY SEEDS

DO

Time: 30 minutes on planting day; 30 minutes on solution day

Materials/Resources:

- Small pot for each member; enough potting “soil” for every pot; trowel; a variety of fruit, vegetable and herb seeds that have distinctive characteristics (i.e. leaf appearance, smell, colour, etc.) sealed in individual packages that give planting instructions but do not reveal their name; water; plastic bag for each pot

Instructions:

1. Give each member a pot.
2. Demonstrate moistening the potting “soil” and then give each member enough to fill their pot, demonstrating how to tap it on the table and firm with your hand.
3. Give each member a seed package and instruct them to plant the seeds in their pot according to the directions on their package.
4. Have members water their pots and place them in the plastic bags if their package directions indicate they should be covered while germinating.
5. Remind members of how to care for a seedling and ask them to take their mystery seeds home to care for and bring back at a later meeting. Ask them to observe their seedling carefully and try to determine what plant they are growing.
6. Once all the plants have growing into seedlings, have the members bring their plants to a meeting armed with an opinion about what plant they have been tending. Have each member share their opinion and then reveal the name of their plant. Some seedlings may not survive, have members share the difficulties they encountered starting a plant from seed.
7. Harden off the seedlings and plant them in the garden.

REFLECT

Learning Outcomes:

Members will have an opportunity to plant and care for a seedling, observing their plant’s unique characteristics.

APPLY

Processing Prompts:

On planting day:

- What are the two main things that your seed/seedling will need in the coming weeks?
- When should you uncover your pot?
- What are some things that might help you determine what you are growing?
- On solution day:
- Did you have any difficulty getting your plant from seed to seedling?
- What information did you use to make your determination about what plant you were growing?
- What do you need to do before planting your seedling in the garden?

Vegetable	Distance between rows (cm)	Distance between plants (cm)	Planting depth (cm)	Recommended dates for outdoor Seeding	Recommended dates for outdoor Trans-planting	Time from Indoor Seed to Outdoor Transplant	Days to Harvest	Average Sowings	Remarks
Asparagus	100	30	2.5-4	May 15-30	April 15- May 10	1 year	3 years	-	Transplant seedlings to permanent bed the next spring, before the buds on the crown break dormancy.
Bean, Bush	60	5-8	4-5	May 5 - June 15	-	-	50-70	4	Does best on warm loam where nights are dry. Plants bear more pods if picked young. Warm climate preferred.
Bean, Lima	60	5	4-5	May 20-30	-	-	70-80	1	
Bean, Pole	60-90	20-30	4-5	May 5-25	-	-	60-70	1	Grows best when trained on fence or poles.
Beet	45-60	3-5	1.5	Apr. 20 - June 1	-	-	55-70	Many	Use thinned plants for greens.
Broccoli (early)	60-75	45-60	0.5 - 1.5 or trans-plants	-	April 25-May 5	4-6 weeks	60-70	1	In spring transplant as early as possible to miss summer heat. (Late sowing also helps plants escape summer heat at heading time.) Always cut broccoli when the individual buds on the clusters are still tight. After the central head is harvested, small side branches develop and may be picked every few days.

Eggplant	60	60	1.5	-	June 1-14	8-10 weeks	70-80	1	Grow in a protected site in rich, warm soil. Harvest before the glossy stem colour becomes dull and the flesh tough.
Endive (early)	60	20-30	0.5-1	April 20 - May 10	-	-	90+	2	Sow in the spring as early as possible or grow as a fall crop.
Endive (late)	60	20-30	0.5-1	June 1-20	-	-	90+	2	Grows best in the fall.
Herbs (dill, cress)	60	7	0.5-1	May 10-30	-	-	As required	1	Easy to grow.
Herbs (summer savory, sage, thyme)	50	15	0.5-1	May 10-30	-	-	As required	2	Barely cover seed.
Kale	70	60	0.5	April 1- June 1	-	-	55-60	1	Light autumn frost improves the quality.
Kohlrabi	60	10	2.5	April 30 - July 1	-	-	60+	3	Use when stems are slightly smaller than tennis balls.
Leek	60	1.5	1.2	May 10-20	May 15- June 25	8 weeks	150	1	Can be grown in the garden until late fall; very frost hardy.
Lettuce, head (early and late)	45-60	30	0.5-1	April 1-10; June 25 - July 5	April 1-20	8-10 weeks	75-85	Many	Sow either early or late, as it grows best if heading does not occur during period of summer heat.
Lettuce, leaf	45-60	15-30	0.5-1	April 1- August 1	-	-	40-45	Many	Extra tender if not thinned.
Muskmelon	120	30-60	1.5-2.5	-	May 20 - June 10	4-6 weeks	80-120	2	Guard against cucumber beetle.

Okra	60	30	2.5	-	May 25 - June 1	4 weeks	50-60	2	Required heat and a lot of attention. Used to flavour soup and stews. Pick young tender pods every other day.
Onion (seed or set)	45-60	5-8	1.5-3	April 5 - 25	-	4 weeks	-	2	Sets favoured for early bulbs and green onions.
Onion (trans-plants)	45-60	8-10	-	April 10 - 20	April 10 - 20	10 weeks	115-135	1	
Parsley	60	10	0.5-1	May 10 - 30	May 10 - 30	-	110	1	When potted, also used during winter to garnish food.
Parsnip	45-90	2.5-5	2.5-5	April 10 - May 25	-	-	60-75	2-3	Must use fresh seeds each year. Very slow to germinate.
Peas	45-90	2.5-5	2.5-5	April 10 - May 25	-	-	60-75	2-3	Sow early. Will not grow successfully in summer heat.
Pepper	60	60	1.5	-	June 1 - 20	7-10 weeks	65-75	1	Needs a protected site with rich warm soil. Green peppers are peppers that have not fully ripened.

Potato (early)	75-90	25-30	10	April 5 - May 5	-	80-100	1	Fertilize according to soil test. If a test is not available, work 80 mg/m of row of 8-16-16 before planting. When the crop is 15-30 cm high, broadcast 15 g/m of row of 34-0-0 and hill the crop immediately. Control insects. Keep harvested tubers from light or skins will turn green. Later varieties store better than early ones. Yukon gold is an excellent keeper.
Potato (late)	75-90	25-30	10	May 1 - June 1	-	110-130	1	Fertilize according to soil test. If a test is not available, work 80 mg/m of row of 8-16-16 before planting. When the crop is 15-30 cm high, broadcast 15 g/m of row of 34-0-0 and hill the crop immediately. Control insects. Keep harvested tubers from light or skins will turn green. Later varieties store better than early ones. Yukon gold is an excellent keeper.
Pumpkin	180-250	60-120	2.5	May 25 - June 15	-	100-110	2	Place plenty of manure under trench in which seed is sown.
Radish	30	2.5	1.2	April 1 - May 1 or Aug. 1 - Sept. 1	-	25-35	4	Will grow right up to the first snow flurries. Lack of water causes no flavour and woody texture.

Rhubarb	90	90	-	-	April 14 - May 1	-	2-3 years	-	Requires a rich topsoil.
Spinach (early)	45-60	10-15	1.5-2.5	April 1 - 20	-	-	40-45	2	Does not grow on hot, sandy soil. Does best under cool conditions and on rich loam.
Spinach (late)	45-60	10-15	1.5-2.5	July 15 - Aug. 1	-	-	40-45	2	Does not grow on hot, sandy soil. Does best under cool conditions and on rich loam.
Squash	180-250	60-120	2-3	May 25 - June 10	-	-	95-110	2	
Tomato (unstaked)	90	90	1.2 or transplants	-	May 15 - June 15	6-8 weeks	62-66	2	Use a 1:2:3 fertilizer ratio as a side dressing after first flower cluster has set fruit.
Tomato (staked)	60	45-60	1.2	-	May 15 - June 16	6-8 weeks	75-82	1	Use a 1:2:3 fertilizer ratio as a side dressing after first flower cluster has set fruit.
Turnip	45-60	15-20	0.5-1	June 10 - July 1	-	-	50-55	1	Best as a fall crop. Will grow to first snow. Keeps well in fruit cellar.
Water-melon	120-180	30-60	2-3	-	May 25 - June 10	4-5 weeks	80-95	2	Use a 1:2:3 fertilizer ratio at planting time.

Broccoli (late)	60-75	45-60	0.5 - 1.5 or trans-plants	May 5 - July 10	June 1 - July 15	-	60-70	1	
Brussel Sprouts	60	60	0.5	-	April 5-25	4-6 weeks	70+	2	Nip out growing points of plants once Sprouts start to form.
Cabbage (early)	60-75	45	0.5-1.5	-	April 5-25	4-6 weeks	70-80	2	Heavy feeders. Grow on rich soil. Bolds more easily when exposed to prolonged cool weather, so do not plant earlier than recommended.
Cabbage (late)	60-75	45-60	0.5-1.5	May 10 - June 1	May 24- June 10	4-6 weeks	85+	-	Do not attempt late sowing in districts with short growing seasons.
Carrot	45-60	3-5	1.5	April 15 - June 1	-	-	65-75	many	Thin at bunching stage. In heavy soils use short varieties.
Cauliflower (early)	60-75	45-60	0.5-1.5 or trans-plants	-	May 5-10	4-6 weeks	60-75	1	Tie leaves over heads when nearing maturity. Purple type does not need tying. Harvest before heads become coarse and "ricey".
Cauliflower (late)	60-75	45-60	0.5-1.5 or trans-plants	May 5 - June 20	June 25-July 25	4-6 weeks	60-70	1	Can be transplanted well into June for fall maturing.
Celery (early)	60-90	15	0.3	-	May 5-15	10-12 weeks	120-150	1	Seed heavily as germination is often poor. Do not sow late in districts with short growing seasons.
Celery (late)	60-90	15	0.3	April 10-20	July 1-10	10-12 weeks	120-150	1	Seed heavily as germination is often poor. Do not sow late in districts with short growing seasons.

Chard, Swiss	60	20-30	1.5	April 10 - June 1	-	55+	many	Harvest outside stalks only.
Chinese Cabbage	60-75	20-30	0.6	April 10 - June 1	-	75+	1	Sow late as it grows best in the fall.
Corn (early)	75-90	15-25	2.5	April 25 - July 1	-	60-70	2	Plant at least three or four rows of the same variety to ensure good pollination and kernel formation. Plant early and late varieties at the same time. Make successive plantings of late varieties every 15-20 days. If only one early or late variety is replanted, do it one week after first planting.
Corn (late)	75-90	15-25	2.5	April 25- June 15	-	80-95	2	Plant at least three or four rows of the same variety to ensure good pollination and kernel formation. Plant early and late varieties at the same time. Make successive plantings of late varieties every 15-20 days. If only one early or late variety is replanted, do it one week after first planting.
Cucumber	120-150	30-60	1.5-2.5	June 1-10	4 weeks	60-70	2	If started indoors, plant in pots. Harvest before fruits yellow.

UNIT E: SPRING PLANT AND SOIL CARE

SETTING OBJECTIVES:

Once seeds and seedlings are planted in the garden they may require a bit of extra care through the early weeks of the growing season. Knowing which plants require special care and which can survive a late frost will help ensure a successful harvest.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members will understand which crops are frost-hardy, semi-frost hardy and frost tender.
- Members will understand when and how to cover crops to protect them from frost.
- Members will explore the wide variety of mulches that can be used in food gardens and chosen one to use on their garden site.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Frost hardiness
- Row covers, hot caps and cold frames
- Organic and inorganic mulches

ACTIVITIES:

1. Create a microclimate with a tomato cage hothouse
2. Make your own hot cap
3. Make a cold frame
4. Mulch Madness!

Sample Meeting Agenda Time: 3 hours 25 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Frost Row Covers, Hot Caps and Cold Frames	15 min
Activity	Activity #1: Create a microclimate with a tomato cage hothouse	20 min
	Activity #2: Make your own hot cap	30 min
	Activity #3: Make a cold frame	60 min
Topic Information	Mulch	10 min
Activity	Activity #4: Mulch Madness!	30 min
At Home Activities/ Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

FROST

Some seeds and seedlings will require a bit of extra care until they are fully established in the garden. One of the things we may have to protect them against is a late frost. When it comes to their ability to survive a frost, crops are generally divided into four categories: frost hardy, semi-frost hardy, semi-frost tender and frost tender. Knowing the preferred soil temperature for germination of your crops will give you an excellent idea about which plants can survive a late frost.

Frost hardy crops can resist a few degrees of frost (-2 to -4 degrees Celsius), as long as the temperature drop is not too extreme. Among the frost hardy crops are broccoli, Brussels sprouts, cabbage, kale, kohlrabi, leaf lettuce, leeks, onions, parsley, radish, rhubarb, spinach and turnips.

Semi-frost hardy plants can tolerate temperatures of 0 to -2 degrees Celsius for short periods of time. Among the semi-frost hardy crops are asparagus, beets, bok choy, carrots, cauliflower, celery, head lettuce, many herbs, Swiss chard and potatoes.

Semi-frost tender plants will suffer damage to leaves and stems at temperatures of 0 to -1 degree Celsius, but young shoots tips and buds can usually withstand the cold. Among the semi-frost tender crops are snap beans, sweet corn and tomatoes.

Frost tender crops are killed at temperatures of 0 to -1 degree Celsius, and young transplants and flower buds can suffer injury when temperatures fall below 10 degrees Celsius. Among the frost tender crops are amaranth, basil, beans, cantaloupe, corn, cucumber, edamame, eggplant, okra, peppers, pumpkin, summer squash and watermelon.

It is possible to protect semi-tender and tender crops from a late frost by covering them early enough in the day to retain some heat and leaving them covered overnight. Watering plants the day before or day of an expected frost can also help protect them as the moisture in the soil will give off heat underneath the covering. You can use plastic, burlap or polyester fabric as a covering and just lay it over the plants, making sure to hold it down securely on all edges, or construct a row cover or hot cap.

ROW COVERS, HOT CAPS AND COLD FRAMES

Gardeners use row covers and hot caps for more than just protection from frost. Covering crops creates a microclimate around the plants, increasing soil and above-ground temperatures and retaining moisture in the soil, while also protecting from wind damage, insects, and animals that enjoy snacking on tender seedlings.

Water and air permeable row covers can be left in place all season for some crops, but crops that flower will need to have their row covers removed so that pollinators have access to the flowers. If row covers will be left in place, it is important to monitor temperatures under the row covers. If the temperature under the row cover is between

Share it!

Which of your crops do you think will be hardy, semi-hardy, semi-tender and tender?

Do It!

Activity: Create a microclimate with a tomato cage hothouse.



32 and 35 degrees Celsius the cover should be removed.

Row covers for vine and other low growing crops can be laid directly over the plants, while row covers for taller crops should be held above the plants by hoops or stakes.

Hot caps are used to protect individual plants. Their smaller

size means that temperatures can rise faster around plants, so unless they are ventilated at the top they must be removed each morning. Those with ventilation can remain around crops during the early part of the growing season, but should be removed before the hot weather arrives. You can purchase hot

Do It!

Activity: Make your own hot cap.



caps at garden centres, but it is very easy to make your own.

Cold frames are another way to create a microclimate in your garden and can be used to extend the growing season, start seeds and harden off seedlings. Cold frames can be permanent or portable structures and

can be built out of a variety of materials, but all cold frames feature a top, or lid, made of glass or clear plastic.

The difference between a row cover and cold frame is that water and air cannot penetrate a cold frame so it is important to monitor the moisture level inside your cold frame, watering as needed, and to lift the lid of the cold frame on mild days to allow air to circulate around plants. Setting a portable cold frame over your garden site two weeks before planting seeds or seedlings will raise the soil temperature and allow you to get a head start on the growing season.

If your garden plan includes a raised bed you can easily create a cold frame by placing a lid of glass or clear plastic over the frame of your raised bed.

MULCH

Mulch is another way to protect plants and soil. Mulch is a protective covering placed around plants to preserve soil moisture, control soil temperature and prevent the freezing of roots, growth of weeds and erosion of soil. Mulch is usually made of organic material like wood shavings, straw or leaves, but it can also be plastic sheeting of various colours, landscape fabric or gravel/stones.

Organic mulches provide nutrients to plants, improve soil structure, allow the soil to retain moisture and boost the development of beneficial micro-organisms in the soil. Composted bark chips, cocoa beans, compost, ground corn cobs, chopped corn stalks, grass clippings, leaves, manure, shredded newspaper, hay, sawdust and straw are all examples of organic mulches that will enrich the soil as they decompose.

Once seeds have germinated, make sure the garden is free of weeds and then apply a generous layer of mulch, leaving a gap of three to five centimetres around stems of seedlings and 15 to 30 centimetres around the trunks of berry bushes and fruit trees. Dense mulches like sawdust or ground corn cobs should be applied five to eight centimetres thick, while airier mulches like hay or straw should be eight to 15 centimetres thick. Avoid applying mulch to soil that is either extremely wet or extremely dry.

Do It!

Activity: Build a cold frame.



Organic mulches that are low in nitrogen, like wood chips and sawdust, will temporarily deplete the soil of nitrogen. This loss can be combated by applying a nitrogen rich fertilizer or compost to the soil bed before applying the mulch.

Plastic mulches come in clear, black or brown. The black and brown varieties will warm the soil and suppress weeds, while clear varieties do not keep weeds from germinating. Using plastic mulch allows gardeners to grow late maturing crops in areas where the growing season is short. It also keeps crops cleaner, by reducing the soil that is splashed up onto leaves and stems during rainfall and watering.

To use plastic mulch, lay it over a weed free garden site that is firm and gently tapered toward the edges, and anchor it on the edges by digging it into the soil or placing rocks on the edges. Cut holes where seeds and/or seedlings will be planted and, once they are in place, water as usual making sure there are no puddles on the plastic. Plastic mulch should not be used around shrubs.



Landscape fabric is used in similar fashion to plastic mulch, while gravel or stones are best used in containers as they do not decompose and are hard to remove from larger garden sites.

Experience it!

Visit a commercial vegetable grower to see a variety of mulches in use.

Do It!

Activity: Mulch madness!
Compare a variety of mulches and decide which mulch you will use on your garden site.

AT HOME ACTIVITIES / DIGGING DEEPER!

1. Plant a frost hardy crop two to four weeks earlier than indicated on your “Seed or Seedling?” Worksheet and protect it with a row cover or tomato cage hothouse. Keep the group up-to-date on growth rate, moisture needs and harvest quantity.
2. Research the advantages and disadvantages of four to eight different types of mulch, prepare a presentation or chart and share with the group.
3. Use plastic mulch on one row of a late maturing crop and leave one row mulch-free. Take growth measurements every two weeks, record weed growth and water requirements of both sites.
4. Mulch three rows/plants of the same crop in three different organic mulches. Record growth rate, weed growth and water requirements of the rows/plants and any other advantages/disadvantages of each mulch.

ACTIVITIES:

ACTIVITY #1

MAKE YOUR OWN HOT CAP

DO	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– One large, clear or translucent plastic bottle for each member (for example large pop bottles, milk, water or cider jugs); scissors or utility knife <p>Instructions:</p> <ol style="list-style-type: none">1. Using scissors or utility knife cut the bottom off the jug. Cutting as close as possible to the bottom gives you more material to push into the soil and allows you to protect a taller plant.2. To use the hot cap place it over individual plants, pushing it securely into the soil. Remove in the morning before temperatures begin to climb.
REFLECT	<p>Learning Outcomes:</p> <p>Understanding how to protect crops from frost damage and having a hot cap to use in the member’s garden site.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– Why is it important to remove a hot cap before temperatures rise?– What could we do to the hot cap to allow it to remain on the plant throughout the day?– Which of the plants in your garden plan will you need to cover when frost is expected?

ACTIVITY #2

BUILD A TOMATO CAGE HOTOHOUSE

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Wire tomato cage; clear plastic wrap or clear plastic bag; scissors; duct tape <p>Instructions:</p> <ol style="list-style-type: none">1. Leaving room to push the cage into the soil, start at the bottom and wrap the plastic wrap around the cage overlapping by half on each layer and pressing the plastic wrap together so that it makes a firm seal. Allow the final layer to extend over the top of the cage and tuck it down inside. If needed, secure with duct tape.2. Push the cage firmly into the soil around the plant to create a microclimate. Make sure the plastic wrap goes all the way to the soil. Push a layer of soil or mulch up against the outside of the plastic wrap.3. On cool nights you can cover the top of the hothouse with additional plastic wrap, a board or piece of heavy fabric to protect the plant from frost.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will understand how to create a microclimate and have their own tomato cage hothouse to use in their garden site.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none">– How does the tomato cage hothouse create a microclimate?– How else could you create a microclimate in your garden site?– Will plants inside the tomato cage hothouse require any special care?

ACTIVITY #3
BUILD A COLD FRAME

DO	<p>Time: 60 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Recycled window; material to build a frame the same size as the window (straw bales, cement block or wood); stick(s) to prop up window; if using wood: measuring tape, saw, L brackets and screws, two hinges and screws, drill, screwdrivers <p>Instructions:</p> <ol style="list-style-type: none">1. Build a frame the same size as the recycled window using straw bales, cement blocks, wood or other materials.2. If using wood, measure and cut the wood the same dimensions as the window. Attach the pieces of wood together with L brackets and screws to create a sturdy box.3. Attach the window to the box with hinges and screws (the window will open upward). Prop the window open to allow air to circulate through the cold frame on warm days.
REFLECT	<p>Learning Outcomes:</p> <p>Members will gain knowledge about warming the soil and extending the growing season and will have a cold frame to use at the garden site.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– In what different ways can a cold frame be put to use in the garden site?– What other materials could we have used to construct the cold frame?– Why is it helpful for the cold frame to have hinges?

**ACTIVITY #4
MULCH MADNESS!**

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – Samples of organic and inorganic mulch (for example compost, sawdust, straw, composted bark chips, chopped corn cobs, landscape fabric, plastic mulch of various colours, gravel); tarps to cover surfaces and/or containers to hold samples; optional paper and pencils <p>Instructions:</p> <ol style="list-style-type: none"> 1. Working either individually or in small groups invite members to take samples of each mulch and consider their density, the ease with which they will break down and/or be removed from the soil bed, whether they will warm or cool the soil, and any additional impacts to the garden site. Members could record their findings if desired. 2. Ask members to choose the best mulch for their garden site. They may choose to use different mulches around different crops.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will be familiar with a variety of garden mulches and will have selected the best mulch(s) for their garden site.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Which mulch do you think will be the best at warming the soil? – Which mulch do you think will be the best at preventing weeds? – Which mulch do you think will provide the most benefits to the soil?

UNIT F: CLASSIFYING, PRUNING, THINNING AND SUPPORTING PLANTS

SETTING OBJECTIVES:

Understanding the growing habit and classification of plants can help ensure we care for each plant in the way that will maximize the harvest. Thinning, trimming, pruning and supporting plants also helps them battle against insects and disease.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Member will understand the growing habits and classification of fruits, vegetable and herbs.
- Members will understand when and how to thin, trim and prune plants.
- Members will understand which plants need supportive structures to maximize their growth and what type of structures are best for each plant.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Growing habits
- Plant classification
- Thinning and trimming plants
- Supporting plants
- Pruning trees and shrubs

ACTIVITIES:

1. What plant am I?
2. Twisted Carrots!
3. Prune a branch
4. Make a Garden Journal

Sample Meeting Agenda Time: 3 hours

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Sorting plants	20 min
Activity	Activity #1: What plant am I?	15 min
Topic Information	Thinning and Trimming	10 min
Activity	Activity #2: Twisted Carrots!	15 min
Topic Information	Support Pruning	20 min
Activity	Activity #3: Prune a branch	30 min
Activity	Activity #4: Make a garden journal	30 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

SORTING PLANTS

Fruits, vegetables and herbs can be grouped in a variety of ways. An easy method of sorting is to group them according to their growing habits.

Leaves and Stems: Plants in this group are known for their leafy structures. We usually do not eat the flowers. Among the plants in this group are broccoli, cauliflower, kale, lettuce and spinach.

Fruits and Seeds: These plants produce flowers that then turn into the part of the plant that we eat. The plants in this group require either self or cross pollination to produce a crop. Among the plants in this group are apples, corn, peppers, squash and tomatoes.

Roots and Bulbs: The parts of these plants that are most often eaten are the parts that grow underground. Among the plants in this group are beets, carrots, garlic and onions.

Legumes: A sub-group of Fruits and Seeds, legumes produce a flower which, when pollinated, grows into a fruit with seeds. The difference is that legumes can return nitrogen to the soil to be used by other plants. Among the plants in this group are green beans, lentils, peas and peanuts.

It is also helpful for gardeners to be aware of the scientific classification of fruits, vegetables and herbs. All plants are members of the Kingdom Plantae and from there scientists subdivide plants by their characteristics through...

Subkingdom ⇨ Superdivision ⇨ Division ⇨ Class ⇨
Subclass ⇨ Order ⇨ Family ⇨ Genus

all the way down to Species, and in some cases Variety.

The rank that is most helpful for gardeners is Family. Most berry bushes and fruit trees planted in Ontario gardens are members of the Rosaceae or Rose family and the seven vegetable families that are commonly planted in gardens are:

- Allium or Onion family, which includes varieties of onion, chive, garlic, leek, and shallot. Alliums grow in a wide variety of soil types.
- Apiaceae or Carrot family, which included varieties of carrot, celery, cilantro, dill, fennel, parsley and parsnip.
- Brassica or Mustard family, which includes varieties of mustard, broccoli, Brussels sprouts, cabbage, kale, kohlrabi, pak choi, radish, turnip and rutabaga. Brassicas are nitrogen-loving, cool-season crops.
- Chenopodiaceae or Goosefoot family, which includes varieties of beet, spinach and Swiss chard.
- Cucurbit or Cucumber family, which includes varieties of cucumber, melon, pumpkin, watermelon, summer and winter squash. Cucurbits are warm-season vegetables and

Look it up!

Watch a video about the parts of a plant.

Look it up!

Watch a video about plant classification.

they require pollination from honey bees or native bee populations.

- Fabaceae or Pea family, which includes varieties of peas, beans, lentils and peanuts. Fabaceae plants return nitrogen to the soil to be used by other plants.
- Solanaceae or Potato family, which includes varieties of potatoes, eggplant, groundcherry, tomato, hot and sweet pepper.

Members of each family may not grow in the same way, for example, tomatoes grow above ground and potatoes grow below ground, but they extract the same nutrients from the soil to grow the edible part of the plant. To keep the nutrient levels in your garden site balanced, it is best to rotate each vegetable family through the site so that they do not grow in the same soil every year. This practice, called crop rotation, also helps to control insects and disease.

For example, planting a nitrogen loving crop from the Brassica or Mustard family in soil where a member of the Fabaceae or Pea family was grown the year before will provide plenty of nutrients for plant growth and help prevent club root, a disease that affects members of the Brassica or Mustard family.

Knowing which family your crops belong to and their growing habit will help you care for them throughout the growing season. For some plants, a bit of thinning or support will help produce the most abundant harvest possible.

Do It!

Activity: What plant am I?

THINNING AND TRIMMING

While it is easy to properly space large seeds like beans, plants with tiny seeds, like carrots, often end up too close together. Thinning out the plants once they are five to eight centimetres tall gives each one the room they need to grow, reduces competition for water and nutrients and improves air circulation.

It is best to thin later in the day and when the soil is moist so the remaining plants have an opportunity to adjust to the disruption before facing a hot, sunny day. You can thin plants by gently pulling out smaller, less vigorous seedlings or by cutting them off at the soil.

Do It!

Activity: Twisted Carrots!

Among the plants that benefit from thinning are beets, carrots, lettuce, onions, parsnips, radishes, rutabagas, spinach and turnips.

Fruiting crops often benefit from having some shoots and blossoms trimmed off in order to direct more growth toward the production of fruit. For example, tomato plants benefit from having “suckers”, shoots that are growing at a 45 degree angle between the main stem and a side stem, removed. Watermelon plants benefit from having some blossoms removed so that the plant can direct all of its energy toward producing a few large healthy fruits, rather than many small fruits which may not ripen before the end of the growing season. You can trim shoots and blossoms by hand or with a small pair of pruners.

Look it up!

Watch a video demonstrating how to pinch off a tomato plant.

SUPPORT

Once climbing and vining crops are firmly established in the garden it is time to start training them to climb or lean on their supportive structures. Training plants to climb allows you to maximize space in your garden site, allows the crop to receive more light so that it will ripen evenly, makes harvesting easier, provides a bit of a challenge to insects that might like to nibble on your crop and can provide welcome shade to neighbouring crops.

Among the plants that thrive with a bit of support are pole beans, cucumbers, grapes, melons, peas, squash, and tomatoes.



Plants climb in three different ways, some have tendrils that extend out from the plant looking for something to grab onto, some twine as they grow, and others scramble across the ground and will grow additional roots from nodes along their vine if they are not supported.

Plants with tendrils, like cucumbers, melons, peas and squash, appreciate a sturdy support with thin pieces for the tendrils to grab onto. The tendrils are only about three centimetres long so string, wire, nylon, netting or thin branches are all good options for them to grab. When melons are grown vertically each fruit needs to be supported by a sling, usually made of fabric.

Plants that twine, like pole beans, have stems that will wrap around almost any type of supportive structure, like a pole, fence or trellis. Many gardeners pinch off the ends of the vines when they reach the top of the support.

Plants that scramble, like tomatoes, need to be either tied to (i.e. a pole) or hemmed in by their support (i.e. a cage). Keeping them up off the ground helps the plant direct energy toward producing and ripening fruit rather than developing additional roots. Use soft materials to attach the plant to the support (for example, strips of fabric or old nylon stockings) and tie in a figure

eight — loop the tie around the support, cross the two ends, then loop around the plant stem and tie, leaving some slack so the stem can move and grow.

PRUNING

Most fruit bushes and trees require pruning. Detailed information about the pruning needs of different varieties can be found on the Ontario Ministry of Agriculture, Food and Rural Affairs website <http://www.omafra.gov.on.ca>.

Pruning is most often done when the plant is dormant, either in early spring, before the crop begins to produce buds, or in the fall, after the crop has been harvested but before the

temperature falls significantly. Trees and bushes are pruned to remove weak, diseased, injured, spent, crowded or narrow-angle branches or canes, to improve the shape and weight bearing ability of the tree or bush, and to increase yield.



Experience it!

Visit a commercial fruit orchard or watch a video to learn how to prune a fruit tree or berry bush.

Do It!

Activity: Prune a branch.

Do it!

Activity: Make a Garden Journal.

AT HOME ACTIVITIES / DIGGING DEEPER!

1. Design a four-year crop rotation system that reflects the growing habits and classification of the fruits, vegetables and herbs in your/the group's garden site.
2. Research plant classification and design a visual aid for the group that details the Kingdom, Subkingdom, Superdivision, Division, Class, Subclass, Order, Family, Genus and Species of common garden crops.
3. Research and design a vertical garden, including any support structures that will be needed.
4. Research pruning methods for a tree or shrub on your property and prune the tree or shrub (with permission), taking before and after photographs. Make a presentation to the group explaining why you chose to prune each branch and the benefits to the shrub or tree.

ACTIVITIES:

ACTIVITY #1

WHAT PLANT AM I?

DO	<p>Time: 15 to 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Cue cards, one for each member, with the name of a different fruit, vegetable or herb on each card; tape or pins to attach the cards to the member’s backs. <p>Instructions:</p> <ol style="list-style-type: none">1. Attach a card to each member’s back without telling them what fruit, vegetable or herb is written on the card.2. Ask members to circulate around the room asking “Yes/No” questions to try and determine which fruit, vegetable or herb they are. Provide example questions related to growing habit and classification, for example, “Am I a legume?” or “Am I a member of the Brassica family?” and/or elements from other meetings, for example, “Can I grow in the shade?” or “Can I be seeded directly into the ground?”3. (Optional) Once all members have figured out what is written on their card ask them to sort themselves into groups by growing habit and/or family.
REFLECT	<p>Learning Outcomes:</p> <p>Gain a greater understanding of the growing habits and classification of fruits, vegetables and herbs.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– How does it help us as gardeners to understand the growing habits of fruits, vegetables and herbs?– How does it help us as gardeners to understand the classification of fruits, vegetables and herbs?

ACTIVITY #2
PRUNE A BRANCH

<p style="text-align: center; font-size: 2em; color: white;">DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – Tree branches of various sizes and lengths; hand shears and/or lopping shears (depending on diameter of branches); safety glasses for each member <p>Instructions:</p> <ol style="list-style-type: none"> 1. Branches coming off the trunk of a fruit tree at an angle of less than 35 degrees are less structurally sound and should be pruned early (the tighter angle offers an entry point for insects and disease, weakening the branch and increasing the likelihood that the branch will break with the weight of the fruit). Ask members to stand up each branch like a tree and mark any “branches” that emerge from the “trunk” at an angle less than 35 degrees. 2. Cuts that involve a growth bud should be done at a 45 degree angle, with the lowest point opposite and level with the bud and the highest point approximately 6 millimetres (¼ inch) directly above the bud (it is best to prune just above a growth bud that is aiming outward from the tree, rather than in toward the tree). Ask members to mark a growth bud on their “branch” that is aiming outward from the “trunk”. 3. Demonstrate the pruning cut used to remove a branch and the pruning cut used above a growth bud and assist each member to make at least one type of pruning cut.
<p style="text-align: center; font-size: 2em; color: white;">REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will learn simple pruning techniques.</p>
<p style="text-align: center; font-size: 2em; color: white;">APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Why do we prune above a growth bud that is aiming outward from the trunk? – How can pruning improve the health of a tree? – How can pruning increase the harvest of a fruit tree?

ACTIVITY #3
TWISTED CARROTS!

<p style="text-align: center; font-size: 24pt; color: white;">DO</p>	<p>Time: 15 minutes on planting day, 15 minutes on thinning day, 15 minutes on harvest day</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – On planting day: carrot seeds; deep container or garden site; water – On thinning day: pruners <p>Instructions:</p> <ol style="list-style-type: none"> 1. Plant two rows/containers of carrots according to directions on the seed packet. Water and care for plants. 2. When plants are five to eight centimetres tall, thin one row/container by clipping smaller, less robust plants off at the soil and/or pulling them out in approximately equal intervals. Do not thin the other row/container. Continue to water and care for plants. 3. When plants are ready to harvest compare the shape and size of the row of carrots that were thinned and the row that was not thinned.
<p style="text-align: center; font-size: 24pt; color: white;">REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will understand the impact of thinning crops at the seedling stage.</p>
<p style="text-align: center; font-size: 24pt; color: white;">APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – On planting day: Did you encounter any difficulties spacing the seeds according to the directions on the seed packet? – On thinning day: Was it easier to clip the plants or pull them out? Were any of the remaining plants disturbed in the process? What do you think the benefits of thinning the row will be? – On harvest day: What was the impact of thinning the row? Was thinning the row worth the investment of time?

ACTIVITY #4
MAKE A GARDEN JOURNAL

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – Small three-ring binder for each member, plastic photo sleeves, three-hole punched blank paper, lined paper and graph paper, permanent markers, colouring markers or pencils, calendar pages (optional) <p>Instructions:</p> <ol style="list-style-type: none"> 1. Members can make and decorate a title page for their garden journal. 2. Seed packets and plant tags can be inserted into the plastic photo sleeves and information about planting dates and location can be written right on the sleeve. 3. Photos of the garden, including plants, supporting structures, insects, weeds, toad houses, etc. can be inserted into the plastic photo sleeves and labelled. 4. The garden plan can be added to the garden journal and notated as the growing season progresses. 5. Dates when seeds and seedlings were planted, when plants sprouted, when blossoms appeared, when crops were harvested, etc. can be noted on calendar pages. 6. Other drawings, notes, recipes and items of interest can be added to the journal throughout the garden season. Members can personalise their journal as they see fit.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will have a visual and/or written record of their garden that they can refer to throughout this and coming years.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – What will you include in your garden journal? – What information will be helpful next year when it is time to plant the garden? – Do you think commercial growers keep similar records of their garden

UNIT G: GARDEN CHALLENGES

SETTING OBJECTIVES:

Insects, animals and diseases are some of the challenges that you may encounter while growing your own fruit, vegetables and herbs. Understanding these challenges, methods of prevention and management strategies will help keep your crops healthy and maximize your harvest.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members will understand the process and importance of pollination.
- Members will explore Common Insects found in the garden, along with strategies for prevention and management.
- Members will consider the variety of animals that might visit the garden and explored strategies to protect crops from animals.
- Members will explore Common Plant Diseases, along with strategies for prevention and management.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Pollination and beneficial insects
- Common Insects, prevention and management
- Animals that visit the garden, prevention and management
- Common Plant Diseases, prevention and management

ACTIVITIES:

1. Build a bee lodge
2. Make a toad house
3. Build a garden buddy
4. Go on a garden investigation

Sample Meeting Agenda Time: 3 hours 35 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Insects	10 min
Activity	Activity #1: Build a bee lodge	30 min
Topic Information	Insects – Prevention	10 min
Activity	Activity #2: Build a toad house	20 min
Topic Information	Insects - Management Animals	20 min
Activity	Activity #3: Make a garden buddy	45 min
Plant Diseases	Plants Diseases – Prevention & Management	10 min
Activity	Activity #4: Go on a garden investigation	30 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

INSECTS

Insects are an essential part of the food web, eaten by other insects, birds, reptiles, amphibians, bats and fish. Among the millions of insect species, 99 per cent present no problems to gardeners. Some of them, pollinators and predators, are an essential part of the garden



ecosystem. Approximately 1,000 plants grown around the world for food, beverages, fibers, spices and medicines need to be pollinated by animals in order to produce their harvest.

If your garden site is on a balcony well above the ground,

pollination may be of particular concern. If pollinators do not find your garden it may be necessary to hand-pollinate some of your crops. There are many books and online resources that can help you learn how to hand-pollinate.

There are, however, a few insects that present challenges to growing healthy fruit, vegetables and herb crops and it is helpful to know how to prevent their arrival in your garden site, or manage them if they do arrive.

PREVENTION:

The first step to keeping insects at bay is having healthy soil — good drainage, soil structure and aeration, helped along by regular additions of compost — in your garden site. Healthy soil gives plants the nutrients they need to grow robustly and fend off invaders.

Companion planting is another preventative strategy. Choosing plants that serve as deterrents, repelling the insects that prey on your crops, or decoys, attracting the insects that prey on your crops, and planting them near-by can help keep your crops healthy.

Attracting bats, birds, frogs, toads and beneficial insects (those that prey on other insects) to your garden site can also help keep the population of pesky insects under control.

Look it up!

Watch a video about pollination and pollinators.

Do It!

Activity: Build a bee lodge.

Some insects can be kept away from the stems/trunks of plants by physical barriers like cardboard tubes, a circle of toothpicks, ashes or plastic tree guards. You can also use a floating row cover, especially during the early spring, to protect tender plants from adult insects.

Do It!

Activity: Make a toad house.

MANAGEMENT:

In a home garden, handpicking is the most effective strategy for dealing with invading insects. If you see one of the insects listed on the *Common Insects* list, simply pluck them off the plant they are eating and squish or drown.



Colorado Potato Beetle. Credit: (<http://www.omafra.gov.on.ca/IPM/english/potatoes/insects/coloradobeetle.html>)

A blast of water is a quick and easy way to remove whiteflies or aphids from the underside of a leaf. If water alone does not do the trick, adding a teaspoon of biodegradable dish soap or Ivory soap to a one litre spray bottle and spraying insect-infested areas is often effective. Chopping up a few cloves of garlic and onion, soaking in one litre of water overnight, and adding one teaspoon of biodegradable dish soap or Ivory soap to the water is also an effective spray.

There are a number of ecological pesticides available to gardeners, but like traditional pesticides they should be used carefully. *Bacillus Thuringiensis* (Bt), diatomaceous earth,

Look it up!

Watch a video about insect control measures in the home garden.





horticultural oils, tanglefoot, nematodes and beneficial insects should be used only as directed. Some can be harmful to beneficial insects and others are only effective on very specific varieties of insects. Beneficial insects should only be purchased from reputable sources; those raised in warmer climates and imported into Ontario may opt to go in search of a warmer home rather than staying to snack on the local insect population.






Traditional pesticides are no longer available to home gardeners in Ontario. They are available to commercial growers, with some classes of pesticides requiring certification through the Grower Pesticide Safety Course.




The Ontario Ministry of Agriculture, Food and Rural Affairs' Integrated Pest Management website (<http://www.omafra.gov.on.ca/IPM/english/index.html>) is an excellent resource for identifying and managing insects and diseases, with all of the information sorted by crop type.

COMMON INSECTS

All photos courtesy of the Ontario Ministry of Agriculture, Food and Rural Affairs, © Queen's Printer of Ontario. For more, visit: <http://omaf.gov.on.ca/IPM/english/index.html>

Crop Impacted	Insect and Image	Description	Predators/Controls
Apple, Pear, Peach, Nectarine, Apricot, Plum and Cherry	Caterpillars (tent caterpillars are the most common) 	Tent caterpillars form a tent-like web that is easy to see	Predators: Parasitic wasps, Baltimore orioles.
Apple, Cherry	Aphids 	Aphids suck sap from leaves, making them curl. Look for ants, they are attracted to the "honeydew" that aphids secrete.	Predators: ladybugs, green lacewings, syrphid fly, hover fly, parasitic wasps. Decoys: Nasturtium. Deterrents: Chives, garlic, nasturtium, coriander, tansy, anise.
Apple	Railroad worm or Apple Maggot 	Small maggots form the familiar tunnels you sometimes see when you bite into fruit.	Predators: crickets, beneficial nematodes. Kaolin clay spray forms a barrier that may prevent infestation. Clean fallen apples off the ground every week.
Gooseberry, Red and White Currants	Currant Sawfly	Masses of small green larvae eat the leaves. They can quickly strip the bushes. Look carefully, they are hard to see.	Predators: Parasitic wasps, predatory beetles. Turn soil over in late fall to freeze the larvae.
Strawberry	Tarnished Plant Bug 	Eat the seeds from fruit, causing it to look bumpy	Predators: Big-eyed bugs, damsel bugs, minute pirate bugs, spiders. Use floating row covers. Spray crops with a garlic spray. Clean up plant debris

Raspberry	Sap Beetle		Enter berries when almost ripe. Check fruit before eating it, so you don't eat these black beetles with cream markings.	Predators: Parasitic wasps. Clean up plant debris. Do not locate the compost pile beside the garden site.
Melon	Cucumber Beetle		Striped yellow and black or yellow with black dots. They eat the leaves. Beetles carry a disease that causes older plants to wilt and die	Predators: Soldier beetle, tachinid fly, braconid wasp, lacewings, ladybugs. Attract predators with: Dill, fennel, coreopsis, goldenrod, native asters.
Many Vegetables	Aphids (see photo above)		Tiny green, red or black insects, they suck the sap of the new growth.	Predators: ladybugs, green lacewings, syrphid fly, hover fly, parasitic wasps. Decoys: Nasturtium, plantain, lambs quarters. Deterrents: Chives, garlic, nasturtium, coriander, tansy, anise.
Many Vegetables	Cutworm		Greyish caterpillars feed by night and curl up just below soil surface by day. Seedlings are nipped off at ground level.	Predators: Tachinid fly, braconid and other parasitic wasps, fireflies, ground beetles. Attract predators with: Dill, fennel, and other members of the carrot family. Cultivate deeply around the plant to expose to predators
Many Vegetables	Grasshoppers		Eat leaves and may destroy the entire garden.	Dissoive <i>Nosema locustae</i> (a protozoan parasite) in water, add bran and put around the garden. The Grasshoppers eat it and before they die they pass the disease along to the next generation.
Cabbage, Broccoli, Brussels Sprouts, Radish, Rutabaga, Kohlrabi	Cabbage Worm		Pale green caterpillars, hard to see. They often lie along the main leaf vein. White butterflies are an indicator that eggs are being laid.	Predators: Yellow jacket and paper wasps, shield bugs, tachinid fly. Attract predators with: Members of the carrot and parsley families.
Corn	European Cornborer (larvae pictured)		Dirty white or pinkish with brown dots. They feed on leaves, move into stalks causing them to break, and feed on cobs and kernels.	Predators: Ladybugs, lacewings, minute pirate bug, spiders, hover fly larvae, downy woodpeckers. Attract predators with: Dill, coriander.
Corn	Sap Beetles (see photo above)		See Raspberries.	See Raspberries.

Onion	Onion Maggots		Maggots tunnel inside bottom of plants. Many plants die.	Predators: Ground beetles, parasitic wasps. Use floating row covers. Remove ALL onions from the garden in the fall.
Potato and Tomato	Colorado Potato Beetle		Striped yellow and black as adults. Larvae are chubby red with black dots and do more leaf eating damage than adults.	Predators: Lacewings, soldier bugs, tachinid fly, ground beetles. Attract predators with: Dill, fennel and members of the Echinacea family. Pick by hand, spray plants with water, use an organic insecticidal soap or use floating row covers.
Pumpkin, Squash, Cucumber	Cucumber Beetle (see photo above)		See Melon.	See Melon.
Tomato, Pepper and Eggplant	Tomato Hornworm		Large, fat, green caterpillar with white stripes on side and a black horn on the hind end. Eats leaves and takes "bites" out of green tomatoes	Predators: Braconid wasp. Attract braconid wasps with: Dill, fennel, other members of the carrot family.
Tomato, Pepper and Eggplant	Sap Beetle (see photo above)		See Raspberries	See raspberries.

ANIMALS

Depending on where your garden site is located, a variety of animals may stop by your garden site for a snack, including bears, birds, deer, groundhogs, mice, moles, moose, rabbits, racoons, skunks and squirrels. Scarecrows and overhead netting may keep birds away from berry bushes, fences, including electric fences, will keep some of these garden visitors out, while family dogs and cats may keep others at bay.

Do it! Activity:
Build a garden buddy.

Planting marigolds, geranium, lavender, oregano or sage will deter some digging visitors, while cayenne pepper, blood meal, human hair and urine around the perimeter of the garden may discourage rodents and deer.

If visiting animals are enjoying more of your crops than you are, try a variety of different deterrents. Each situation is different. It may also be helpful to ask for ideas from an experienced gardener in your area or from a local garden centre.

PLANT DISEASES

PREVENTION:

Preventing disease also starts with healthy soil. Regular additions of compost may help ward off fungal and bacterial diseases and mulching can also help keep plants clean and maintain an even level of moisture. Careful watering at the soil level — ensuring the soil does not splash up on plant stems and leaves — can also help to prevent disease.

Do It!
Activity: Go on a garden investigation.







Purchasing seeds and/or plants that are resistant to diseases common to their variety is an important way to avoid disease. Positioning or thinning plants in the garden site so that they have adequate air flow is another preventative technique. Cleaning pruners with rubbing alcohol or disinfecting wipes between plants also helps to ensure diseases are not transferred from plant to plant. A thorough clean-up of the garden site in the fall and practising crop rotation will also help keep plants healthy.






MANAGEMENT:

Many plant diseases are airborne, so in spite of excellent prevention you may still end up dealing with some of the *Common Plant Diseases*. The best strategy is to recognize the problem early and take steps to control it before it impacts the harvest.

COMMON PLANT DISEASES

All photos courtesy of the Ontario Ministry of Agriculture, Food and Rural Affairs, © Queen's Printer of Ontario. For more, visit: <http://omaf.gov.on.ca/IPM/english/index.html>

Crop Impacted	Disease and Image	Description	Prevention/Control
Apple, Apricot, Cucurbits, Peach, Pear	Scab 	Dark spots form on leaves. If scab is severe, skin on fruit cracks and fruit is deformed	Prevention: Choose resistant varieties. Water at soil level. Copper-based sulphur spray throughout growing season. Control: Not possible to cure.
Apple, Asparagus, Beans, Corn, Garlic, Gooseberry, Onion, Pear	Rust 	Orange, red or brown speckles. Often appears where leaf attaches to stem and spreads upward to rest of leaf.	Prevention: Choose resistant plants. Keep leaves dry and avoid watering when hot and humid. Plant with enough space for good airflow. Clean up plant debris in fall. Control: Copper-based sulphur fungicide.
Apricot, Peach, Plum, Cherry	Black Knot 	Start as light brown lumps, up to 10 cm long, which turn black over time on branches and twigs. Very easy to see in the winter.	Prevention: Choose resistant disease-free plants from reputable growers. Clean up trees annually. Control: Remove all knots and burn or bury under 30 cm of well-packed soil.
Grape, along with many other fruit and vegetable crops	Downy and Powdery Mildew(pictured) 	Downy is earlier than powdery mildew. Both are white and cotton-like and affect new growth. Fruit can be destroyed by these.	Prevention (powdery): Choose resistant varieties. Provide adequate light and air flow. Control (powdery): Organic sprays containing sulphur. See <i>Lettuce for Downy Mildew</i> .
Strawberry	Fruit Rot or Grey Mould (Botrytis) 	Grey mould forms on berries making them rot when almost ripe. Green fruit and flowers are sometimes affected.	Prevention: Keep rows narrow and encourage air flow, avoid excessive use of nitrogen, till crop debris into the soil.
Beans, Beet, Cucumber, Melons, Plum, Potato, Squash, Zucchini	Mosaic Virus 	Mottled leaves, giving a mosaic look. Varying shades of yellow and green mottles are raised and appear like blisters.	Prevention: Choose resistant varieties. Control for aphids. Control: Not possible to cure. Remove plant and dispose of in garbage. Wash hands well and change clothes after handling infected plants.

Broccoli, Cabbage, Cauliflower, Radishes, Turnip	Clubroot		Plant aboveground is not affected until disease has affected the roots. Yellowing and wilting leaves, roots are “club-shaped” and swollen. Roots will decay and plant will die.	Prevention: Do not buy affected plants. Disease is carried in the soil. A pH higher than 7.2 will control the spores. Do not plant affected species where clubroot was a problem for at least two years after soil has been treated. Control: Not possible to cure.
Cucurbit Family, except watermelon	Bacterial Wilt		Leaf wilting that leads to wilting of the entire plant, about a week after the plant has contracted the disease. To confirm bacterial wilt cut the stem at soil level and pull apart the two pieces slowly, will have a sticky, stringy, sap-like substance between the two pieces. Similar to Grapes.	Prevention: Choose resistant varieties. Control: Not possible to cure. Remove plant and dispose of in the garbage.
Lettuce, Brassicas, Cucurbits, Grapes, Onions	Downy Mildew			Prevention (downy): Choose resistant varieties. Ensure adequate air circulation. Keep leaves dry (water at soil level). Control (downy): Copper-based spray.
Potato and Tomato	Early and Late Blight (pictured)		Brown or black lesions on stem, fruit or leaves. Early blight lesions develop a bulls-eye pattern. Late blight spots look greasy or wet or fuzzy. Can consume plant in days.	Prevention: Water at soil level. Prune out branches to keep air moving. Spray every two weeks from end of June until end of season with copper-based sulphur spray. Control: Not possible to cure.
Tomato, Pepper, Melon, Eggplant	Blossom End Rot		On tomatoes especially, fruit will develop a dark circular lesion on the bottom. Lesion will appear sunken and will often develop mould.	Prevention: Ensure adequate calcium in soil before planting. Put the crushed shells of two eggs or some bone meal in the holes before planting seedlings. Mulch to keep water levels even. Control: Not possible to cure.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Research common Ontario insects and create a visual resource for the group identifying those that are garden pests and those that are helpful visitors to the garden.
2. Research common plant diseases in Ontario and create a visual resource for the group to help with early identification and control.
3. Research companion planting. Choosing one crop (i.e. tomato) plant one row/plant with a companion that deters insect pests, one row/plant with a companion that serves as a decoy for insect pests, and one row/plant without any companion. Record the insects that visit each plant and the impact on plant health and harvest quality.
4. Research pollination. Learn which garden plants are self-pollinating and cross-pollinating and hand-pollinate one crop of each type. Record your technique and results to share with the group.

ACTIVITIES:

ACTIVITY #1

BUILD A BEE LODGE

DO

Time: 30 minutes

Materials/Resources:

- Bamboo canes of approximately 6.5 millimetres in diameter (number of canes will depend on number of participants, approximately one or two canes are required per bee lodge); saw or loppers to cut bamboo; clean empty tin cans with one end removed or empty one litre plastic soda bottles; utility knife or scissors; nail and hammer; screws or string/twine for hanging; screwdriver

Instructions:

1. If using plastic soda bottles, use utility knife or scissors to cut off both ends, creating a tube.
2. If using tin cans, poke or drill a hole in the bottom wide enough for the screw.
3. Cut bamboo reeds about 2.5 centimetres shorter than the can or tube they into which they will be inserted (some variation in length is desirable). Pack the can or tube with the cut bamboo reeds until they fit tightly and are not moving around.
4. If using a plastic soda bottle, tie string securely around the centre of the tube and hang (so the reeds are horizontal) in a warm, sunny spot at your garden site. Some protection from rain is desirable.
5. If using tin can, remove reeds and use screw to attach the can in a warm, sunny location (i.e. fence post, wall of a garden shed) near your garden site. A slight downward tilt will help ensure water does not collect around the reeds. Some protection from rain is desirable. Pack reeds back into can so they fit tightly and will not fall out.
6. Watch for the arrival of Mason Bees! These enthusiastic pollinators are only active for a short time in the spring and early summer so you may not see any capped egg cells in the tubes until next year. The female bees will fill the tubes with their eggs, nectar and pollen to feed the young bees. Bee lodges should be stored in a garage or shed during the winter (protect against temperatures below -12 degrees Celsius) and set back outside in late winter (March). Bee lodges should be cleaned in late fall or rebuilt with fresh reeds every other year. There are many excellent online resources with details about removing the cocoons from the reeds and storing them for the winter.

REFLECT	Learning Outcomes: Members will learn how to attract mason bees and gain a greater understanding of their role as pollinators in the garden.
APPLY	Processing Prompts: <ul style="list-style-type: none">- Why is it important to have pollinators in the garden?- What other animals act as pollinators?- Is it possible to raise plants where no pollinators exist? If so, how?

ACTIVITY #2
MAKE A TOAD HOUSE

DO	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– One small clay flowerpot for each participant; acrylic paints; paintbrushes; trowel or shovel <p>Instructions:</p> <ol style="list-style-type: none">1. Each member can paint their toad house with their own design. (Each toad house will be laid on its side and buried to approximately the halfway point.)2. Once the toad house is dry, choose a shady location in the garden site and dig a hole large enough for the pot to fit into on its side. Place the pot in the hole and bury the bottom half (toads like to burrow into the moist ground). You can collect a few leaves from around the garden site and place them inside the toad house to make a comfortable bed for the toad. A small saucer of water nearby will also tempt a toad to move into the toad house. Toads can eat up to 100 slugs and insects every day!
REFLECT	<p>Learning Outcomes:</p> <p>Members will have an attractive piece of garden art that will serve as a home for an insect loving toad.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– Why is it important to have toads in the garden?– What other insect eaters can we attract to the garden?– How else could you construct a toad house?

ACTIVITY #3
BUILD A GARDEN BUDDY

<p>DO</p>	<p>Time: 45 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – A collection of recycled material (tin cans, lids, old CDs, plastic bottles, plastic flowerpots, anything that can survive the elements); wire, wire cutters; nail and hammer; scissors; glue; acrylic paint or permanent markers <p>Instructions:</p> <ol style="list-style-type: none"> 1. Have members lay out their chosen recycled pieces in the shape they desire (can be a person or any shape that appeals to them). 2. Poke or hammer holes into the bottoms, sides or corners of each piece, wherever a connection will be needed. 3. Use the wire to attach each the pieces into the desired shape. To make a jointed shape make a loop in one end of the wire, twisting to secure, then thread the wire through the can/ bottle/etc. and make another loop at the other end. 4. Figures can be painted or coloured with permanent markers if members desire. 5. Garden buddies can be hung in the garden with a length of wire or wired onto a stake and plated in the garden.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will have a garden buddy that may help scare off birds and other animals.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – What features of your garden buddy might make him unattractive to birds and animals? – What crop or container will you place your garden buddy beside? – What else could you construct a garden buddy out of?

ACTIVITY #4
GO ON A GARDEN INVESTIGATION

DO	<p>Time: 30 to 60 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – Camera or previously taken photographs; books about garden insects and plant diseases or a computer with online images of garden insects and plant diseases <p>Instructions:</p> <ol style="list-style-type: none"> 1. Have members bring photographs of insects that have been visiting their garden site and any signs of plant disease that they have spotted to the meeting, or go out into the garden site and take photographs of insects and possible plant diseases. 2. Compare photographs to those in resource books or on websites. Identify the insects and plant diseases that are appearing in the garden site. 3. Using Common Insects and Common Plant Diseases and information from the books and online resources, discuss management strategies.
REFLECT	<p>Learning Outcomes:</p> <p>Members will be able to identify common insects and plant diseases found in the garden site and will be able to detail some management strategies.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Do you think other insects will appear in the garden this season? – Do you think other plant diseases will appear in the garden this season? – Which crops seemed to have the greatest number of insects? Were they beneficial or problematic insects? – Did you see any other animals in the garden that might be snacking on insects?

UNIT H: WEEDING AND WATERING

SETTING OBJECTIVES:

Weeding and watering are two garden tasks that extend throughout the season and a bit of knowledge will help you do both more effectively.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members will become familiar with Common Weeds found in the garden and strategies for prevention and management.
- Member will understand how much water the fruit, vegetable and herb garden requires and has considered different watering methods.
- Members will learn about effective watering techniques and that different plants and seasons have different watering requirements.
- Members will consider water conservation strategies.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Weeds and their unique properties
- Common Weeds, prevention and management
- Watering techniques, water needs of different soil and plant types
- Conserving water

ACTIVITIES:

1. Go on a garden investigation
2. Compare the way water moves through different soil types
3. Soak or starve?
4. Make a watering bulb

Sample Meeting Agenda Time: 3 hours 25 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Weeds	20 min
Activity	Activity #1: Go on a garden investigation	30 min
Topic Information	Watering - knowing your soil	10 min
Activity	Activity #2: Compare the way water moves through different soil types	30 min
Topic Information	Water – knowing your plants	15 min
Activity	Activity #3: Soak or starve?	20 min
Topic Information	Watering – knowing your garden site	10 min
Activity	Activity #4: Make a watering bulb	20 min
Topic Information	Watering – be water-wise	10 min
At Home Activities/ Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

WEEDS

Once we have chosen the crops we want to grow in our garden site we would prefer that all the soil nutrients, sunlight, water and space go toward helping those plants produce an abundant harvest. However, there will always be opportunistic plants that are eager to take advantage of the beneficial growing conditions we have created in our garden site.

We call these opportunistic invaders weeds, and they are interesting plants. Those that thrive are strong competitors, often more robust than the crops we have chosen to grow. Some weeds grow very quickly, while some germinate their seeds quickly, produce thousands of seeds and spread them widely. Some weed seeds can survive in a dormant state for hundreds of years and other weeds have root systems that are many metres long. Some weeds have physical properties that protect them from being eaten by animals or picked by humans (i.e. stinging nettles), while others produce chemical substances that are toxic to plants, animals or humans. Many of the weeds we consider the most problematic are not native to North America. They were introduced by early European settlers, some by accident — on shoes, ships or tools — and some on purpose.

Some plants we consider weeds are beneficial parts of the ecosystem. They stabilize and add organic matter to the soil, provide habitat and food for wildlife and nectar for pollinators, and some are edible.

Maintaining healthy soil, planting intensively and mulching around plants will help keep weeds to a minimum, but when weeds do pop up understanding how the invader grows will help you choose the best strategy for removal. Some weeds are easily pulled, while others should be clipped off at soil level to starve the roots.

Experience it!

Go on a food foraging walk with a local foraging expert.











If you are not sure which weed has arrived in your garden site visit the Ontario Ministry of Agriculture, Food and Rural Affairs' weed gallery <http://www.omafra.gov.on.ca/english/crops/facts/ontweeds/weedgal.htm>.

Quack Grass (OMAFRA), <http://omaf.gov.on.ca/IPM/english/tender/weeds/quackgrass.html>

COMMON WEEDS

All photos courtesy of the Ontario Ministry of Agriculture, Food and Rural Affairs, © Queen's Printer of Ontario. For more, visit: <http://omaf.gov.on.ca/IPM/english/index.html>

Weed Name and Image	Type	Description	Control
Bindweed 	Perennial	Climbing, twining vine with white or purplish-white, trumpet-shaped flowers.	Chop plants off regularly at soil level. Pulling it up will cause it to sprout where the roots were torn. Mulch heavily. Heavy infestations can be combatted by covering with black plastic for a season. Remove with a hoe or pull by hand.
Chickweed 	Annual, winter annual or perennial	Light green, low lying with small white flowers.	Remove with a hoe or pull by hand.
Crabgrass 	Annual	Coarse looking leaves that usually turn purple in summer. Seeds spread easily.	Likes poor soil. Add lots of organic matter to soil. Do not allow it to go to seed, pull or chop off at soil level.
Dandelion 	Perennial	Commonly found yellow flowered weed. If tap root is not removed completely it can sprout again.	When soil is wet use a dandelion weeder or knife to slide alongside the taproot, gently loosen the surrounding soil and then lever the root out.
Pigweed 	Annual	Tall and tough with a reddish tap root. If top breaks off when you are pulling it, pigweed branches out again.	Dig up in early spring while roots are small using same technique as for dandelion. Chop off the tops of older plants at soil level to (eventually) starve roots.
Purslane 	Annual	Low growing with thick, juicy green leaves and reddish stems. Once it reaches the flowering stage it will re-root itself when pulled, so do not leave it lying in the garden.	Hand pull. Dispose of plants in a plastic bag in the garbage. Needs light to germinate so mulch heavily. Seeds can stay dormant in soil so till cautiously.

Quack Grass or Twitch Grass	Perennial		Taller than lawn grass. It is strong and aggressive and spreads by whitish rhizomes (underground stems).	Chop plants off regularly with a hoe to starve the roots. Mulch heavily. Spade up in fall to expose the rhizomes and then pull by hand. Twitch Grass can be spread by tilling.
Thistle	Perennial		Flowering plant with leaves that have sharp prickles. Can stand up to 1 metre tall.	Canada thistle must be dug out by the root. Do not let thistles flower.

WATERING

Having healthy soil, mulching the garden and planting intensively will reduce the amount of water your garden needs, but it is likely your garden site will need to be hand watered throughout the growing season.

KNOW YOUR SOIL:

The first step in being a water-wise gardener is to know your soil and understand how water moves through it. Water moves through sandy soil quickly, requiring more frequent, shorter watering, while clay soil retains water longer and requires less frequent, longer soakings.

On average a garden needs 2.5 centimetres of water every 10 to 15 days, either from rain or hand watering. Use a rain gauge to keep track of rainfall and supplement with hand watering as needed.



Photo by Markus Spiske on Unsplash

Do It!

Activity: Go on a garden investigation.

Do It!

Activity: Compare the way water moves through different soil types.

Watering by hand, either with a watering can or hose with sprinkler attachments, with a soaker hose, with a drip irrigation system, or with a low, revolving sprinkler are all more effective than using an oscillating sprinkler which loses a great deal of water to evaporation and wind. To determine how long it takes a soaker hose, drip irrigation system or revolving sprinkler to provide 2.5 centimetres of water, place containers at different points along the watering system and see how long it takes for 2.5 centimetres to accumulate in the container.

KNOW YOUR PLANTS:

Water needs also depend on the season and the plant. During the heat of the summer water will evaporate more quickly, while in the fall the top layer of soil may seem dry while the layers underneath are still quite moist. Keep an eye on your plants. It is okay if they look a bit

wilted during the heat of the day as long as they perk back up when the temperature cools off at night. If they stay wilted-looking for a 24 hour period it is time to water.

Some plants require more water when they are in bloom or setting their fruit. Climbing plants draw a great deal of water out of the soil and will need more water than some of their lower growing neighbours, while plants with deep roots like carrots and parsnips can reach deep into the ground for moisture and are quite drought tolerant.

Water long enough for the water to go below the general root level, about 15 centimetres deep. This type of thorough watering encourages deep root growth and helps plants cope with summer droughts. If you can water plants individually you will learn which plants may need a bit of extra water and which ones can last a bit longer in between watering.

Do It!

Activity: Soak or starve?

It is best to water in the morning or late afternoon. Watering during the hottest part of the day sees much of the moisture lost to evaporation, while watering in the evening or at night leaves plants damp, attracting insects and providing an ideal environment for the spread of disease.

KNOW YOUR GARDEN SITE:

If your garden site has containers they will need daily monitoring to ensure the soil does not dry out completely. The best way to check the water level in a container is to stick your finger into the soil up to the second knuckle. If the soil at the tip of your finger feels dry it is time to water and you should water until the excess runs out the bottom of the pot. You will quickly learn which plants and pots require the most water. Some plants in hot, windy locations may need to be watered twice a day!

Experience it!

Visit a commercial grower to see a commercial irrigation system, either field or greenhouse.

BE WATER-WISE:

An excellent way to conserve water in the garden is to install a rain barrel and use the water you collect to water your crops. There are many different styles of rain barrels available to purchase, but it is also possible to make your own.

Do It!

Activity: Make a watering bulb.

You can also conserve water by collecting water that would normally run down the sink drain as you wait for temperatures to heat up or cool down. At the end of the day pour this water into your watering can ready to water the garden the next morning!

Share it!

What other ways can you, or do you, conserve water in your house?

AT HOME ACTIVITIES / DIGGING DEEPER!

1. Collect at least 10 weeds commonly found in fruit, vegetable and herb gardens. Include weeds of all different types (for example, annual, perennial and biennial, tuberous, deeply rooted, etc.).
2. Research xeriscaping. What ideas from xeriscaping can be incorporated into the food garden? Design a water-wise food garden.
3. Design and build a drip irrigation system for your garden site.
4. Design and build your own rain barrel.
5. Research hydroponic growing systems and make a presentation to the group or try setting up your own hydroponic system.
6. Research permaculture gardening. What is the approach to water use in the permaculture garden?

ACTIVITIES:

ACTIVITY #1

GO ON A GARDEN INVESTIGATION

DO	<p>Time: 30 to 60 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Camera or previously taken photographs/samples; books about common weeds or a computer with online images of common weeds <p>Instructions:</p> <ol style="list-style-type: none">1. Have members bring photographs or samples of weeds that have appeared in their garden sites, or go out into the garden site and take photographs and/or pick samples of weeds.2. Compare photographs to those in resource books or on websites. Identify the weeds that are appearing in the garden site(s).3. Using Common Weeds and information from the books and online resources, discuss management strategies.
REFLECT	<p>Learning Outcomes:</p> <p>Members will be able to identify common weeds found in the garden site and will be able to detail some management strategies.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– Is one weed especially prevalent in the garden site? What is the best management strategy for that weed?– Are some crops or areas of the garden being more impacted by weeds than other areas? Why?– Is there anything we could have done differently in the spring to prevent weeds? Is there anything we can do differently right now to prevent weeds? Is there anything we can do differently in the fall to prevent weeds?

ACTIVITY #2

COMPARE THE WAY WATER MOVES THROUGH DIFFERENT SOIL TYPES

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Three or four clear plastic containers of 500 grams or larger (i.e. clean empty peanut butter containers) with holes punched into the bottom; shallow containers (i.e. pie plates) to place below each clear container; rocks or other items to raise the clear containers up slightly above the shallow containers; three or four samples of soil types (i.e. clay, loam, sandy); measuring cup; water; stopwatch or sand timer <p>Instructions:</p> <ol style="list-style-type: none">1. Place one type of soil in each clear container. Set the containers on the rocks in the pie plates. (Soil types can be identified or members may be asked to identify the soil type based on the results of Step 2.)2. Measure and pour an amount of water into one container of soil (enough to thoroughly dampen soil sample, but not greater than the holding capacity of the pie plate) and measure, with stopwatch or sand timer, the length of time it takes to move through the soil sample.3. Repeat Step 2, using the same amount of water, for the other soil samples.4. Discuss the differences, recalling the different moisture-holding capacities of sandy, loam and clay soils.
REFLECT	<p>Learning Outcomes:</p> <p>Members will understand water moves through different types of soil at different rates.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– Which type of soil will need to be watered most often? Least often?– Which type of soil would it be most important to mulch? Why?– Would it be possible to change the rate at which the water moved through the soil? How?

ACTIVITY #3
SOAK OR STARVE?

<p>DO</p>	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Sunflower seeds (small varieties) for three short rows/containers; containers (optional), trowel; water; watering can/hose <p>Instructions:</p> <ol style="list-style-type: none">1. Plant three short rows/containers of sunflower seeds according to seed packet directions.2. Care for the three rows/containers of sunflowers according to package directions until they are all well established in the garden site.3. Once the sunflowers are well established follow three different watering patterns. For one row provide a thorough watering, 2.5 centimetres every 10 to 15 days or daily if using containers. For the second row water lightly three times per week, or twice daily if using containers, attempting to keep the top of the soil moist at all times. For the third row allow the soil to dry out before watering in either rows or containers.4. Record the growth patterns and rates of each row/container. At the maturity date listed on the seed packet determine which watering pattern produced the tallest, most robust sunflowers.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will experience the impact of different watering techniques on plant growth.</p>

APPLY

Processing Prompts:

At planting or start of the three different watering patterns:

- Which watering pattern do you think will produce the tallest flowers?
- Do you think any of these watering patterns will attract insects or cause disease?
- Do you think any of these watering patterns will have an impact on the soil?

At maturity date:

- Which watering pattern produced the tallest flowers?
- Were any of the sunflowers affected by disease or insects?
- Did all of the sunflowers survive to maturity?
- What did you learn about the growing habits of sunflowers?

ACTIVITY #4

MAKE A WATERING BULB

DO	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– One litre clean, empty plastic water or soda bottles; strong safety pin or nail and hammer; scissors or utility knife; permanent markers (optional); trowel <p>Instructions:</p> <ol style="list-style-type: none">1. Remove lids from bottles and use safety pin or nail to make three to five holes in the lid. Screw lid back onto bottle.2. Use scissors or utility knife to cut end off bottle.3. (Optional) Members may decorate their watering bulb with permanent markers.4. To place watering bulbs in the garden site, start by watering the plant or container; then dig a hole 10 to 15 centimetres deep beside that plant that will benefit from the water, taking care not to impact the roots; and finally insert the bottle lid side down and pack the soil around it so that it is securely lodged. Fill the bulb with water, which will gradually seep into the soil.5. Periodically wash out the water bulb before inserting back into the garden site.
REFLECT	<p>Learning Outcomes:</p> <p>Members will have a simple watering device to use in their garden sites and will gain a greater understanding of the water needs of plants during different parts of the growing season.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– Which plant will you water with your bulb? Why did you choose that plant?– How often do you think you will have to add water to your bulb?– Do you think this will be an effective watering technique in your garden site? Why or why not?

UNIT I: HARVESTING AND EXHIBITING PRODUCE

SETTING OBJECTIVES:

Understanding the optimal time to pick produce will help you enjoy the garden harvest to the fullest, as will knowing how to store each crop properly. Learning how to exhibit the garden's bounty will allow you to meet and interact with other gardeners at local agricultural shows and fairs.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members can confidently determine when and how to harvest the produce in their garden site.
- Members understand how to best store harvested produce.
- Members have learned the basic principles for exhibiting produce.
- Members have considered the similarities and differences between home and commercial growers and how crops are marketed.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- When and how to harvest and store crops
- Tips for exhibiting produce
- Commercial growing practices

ACTIVITIES:

1. Carve a zucchini
2. Make bumbleberry freezer jam
3. Make vegetable kebabs
4. Show off the harvest

Sample Meeting Agenda Time: 4 hours 20 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Harvest Time – when to harvest	10 min
Activity	Activity #1: Carve a zucchini	30 min
Topic Information	Harvest Time – how to harvest	10 min
Activity	Activity #2: Make bumbleberry freezer jam	60 min
Activity	Activity #3: Make vegetable kebabs	30 min
Topic Information	Harvest Time – how to store Exhibiting the Harvest	30 min
Activity	Activity #4: Show off the harvest	30 min
Topic Information	Selling the Harvest	20 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

HARVEST TIME!

Harvest time is one of most rewarding parts of gardening. There is nothing more satisfying than enjoying a delicious fruit, vegetable or herb that you have cared for and tended throughout the growing season.

WHEN TO HARVEST:

Knowing the date that you planted each seed and the days to maturity for each seed variety will give you a good idea of when the crop will be ready to harvest. There will be variations depending on the weather that was experienced during the growing season, but those dates will provide an excellent guideline.

As you approach the expected harvest dates, start checking the crop for indicators like colour, sheen and size. Crops like tomatoes and peppers will turn colour as they ripen, cucumbers and zucchini will have shiny, healthy looking skin, and you can eat crops like radishes and carrots as soon as they are big enough to be usable.

Follow the seed packet directions carefully for harvesting herbs as some are picked before flowering, some while they are in bud stage, some while they are flowering and some throughout the growing season. Herb growers also favour different parts of the plant, with some herbs grown for their flowers, some for leaves, some for roots, some for seeds and others for a combination of plant parts.

Do It!

Activity: Carve a zucchini.

HOW TO HARVEST:

When you pick fruits, vegetables and herbs, be careful not to damage the parts you are picking or those that you are leaving behind. Damaged produce will not keep as long and if stems are broken the plant will not be able to continue producing or ripening its crop.

Many vegetables are best when picked in the morning, after regaining moisture that was lost during the day, however make sure the plants are dry to avoid spreading disease. At all times of day, keep the harvested produce out of direct sunlight and cool it as quickly as possible.



Attempt to pick only what you will use within a day or two, but if the harvest is so abundant that this is not possible, store according to the crop's unique needs or share with neighbours and friends.

HOW TO STORE:

Specific tips are listed on the *Harvesting Common Fruits and Vegetables* table, but a few general rules apply to storing produce.

- i) Don't wash produce until you are ready to use it. Just brush off any dirt or blossom bits. If it comes out of the garden wet and dirty, let it dry and then brush off the dirt.
- ii) Leave a bit of stem on beets, carrots, cucumbers, eggplant, peppers, radishes and squash.
- iii) Some fruits and vegetables release ethylene gas, which can speed up the ripening and decomposition of other fruits and vegetables. Try and keep ethylene producing crops (apples, apricots, blueberries, cantaloupe, green onions, grapes, honeydew melons, mushrooms, peaches, pears, plums, potatoes, tomatoes) away from ethylene sensitive varieties (asparagus, blackberries, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, chard, cucumbers, eggplant, garlic, green beans, kale, leafy greens, leeks, lettuce, onions, parsley, peas, peppers, raspberries, spinach, squash, strawberries, sweet potatoes, watermelon, yams).
- iv) Store these crops in the refrigerator [approximately 3 degrees Celsius (38 degrees Fahrenheit); 95 per cent relative humidity] — ripe cantaloupe, green beans, peppers, summer squash. Wrap them in a damp paper towel or cotton cloth then place in a perforated plastic bag. Save the ones that come from the grocery store or make your own by poking holes in sealable plastic bags. Place the bags in the crisper or on a shelf farthest away from the freezer.
- v) Store these crops in a cool, humid location [between 10 and 15 degrees Celsius (50 and 59 degrees Fahrenheit); 90 to 95 per cent humidity] — cucumbers, eggplant, tomatoes, watermelon. The refrigerator is too chilly for these crops.
- vi) Store these crops in a cool, dry location [10 to 15 degrees Celsius (50 to 60 degrees Fahrenheit); 60 to 70 per cent humidity] — garlic, onions, sweet potatoes, winter squash. Dark, dry conditions with good air flow are ideal.
- vii) Store these crops in a cold, damp location [0 to 5 degrees Celsius (32 to 40 degrees Fahrenheit); 90 to 95 per cent humidity] — beets, Brussels sprouts, carrots, cabbages, potatoes, radishes, rutabagas, turnips. Root crops will last for several months packed into a moist material like sand or sawdust. Check on stored vegetables regularly and remove any that show signs of rot. Air flow is important so don't seal them off completely.

Share it!

Donate excess produce to local food banks or community kitchens.

Do It!

Activity: Make
bumbleberry freezer jam.

Do It!

Activity: Make vegetable kebabs.

Look it up!

To check the specific storage needs of your crop visit the Postharvest Centre of the University of California, Davis http://postharvest.ucdavis.edu/Commodity_Resources/Fact_Sheets/

HARVESTING COMMON FRUITS AND VEGETABLES

Crop	Days to Maturity	What to Look For	How to Store
Beans (bush and pole)	50 to 70 days, depends on variety	Harvest when beans are about the width of a pencil; about 2 to 3 weeks after you see the first bloom. If they get too big they look chalky and become dry and chewy.	Brush off dirt and store in a plastic bag in the crisper. Wash when you are ready to eat them.
Beets	50 to 70 days, depends on variety	Start to harvest when the roots appear medium sized for the variety. Harvest up until the foliage flowers. Up to 1/3 of foliage can be harvested for greens without harming the root.	Leave some greens on top and store in plastic bag in the refrigerator for two weeks. Store long term in dry sand in a cool, damp (0 to 5 degrees Celsius) place.
Broccoli	50 to 65 days, depends on variety	Cut off the main head, 15 to 20 cm below the head, when it is fully developed, but before it flowers. Side shoots can be cut when they are a usable size.	Mist heads with water, wrap in damp towel and store in the crisper for two or three days.
Carrot	60 to 80 days, depending on variety	Pick them when they are a size you are happy with. About 2 cm across the top is a general guideline.	Leave some greens on top. Brush off dirt, but do not wash until you are ready to use them. Leave fall planted carrots in soil until the ground is ready to freeze.
Cucumber	55 to 65 days, depending on variety	Harvest when they are a size you will eat. The seed packet will tell you how large they should get, do not let them grow too much beyond that. Continual harvesting will keep more cucumbers coming!	Leave a small piece of stem attached. Refrigerate immediately after cutting off the vine, for up to 5 days.
Kale	55 days, depending on variety	Harvest when leaves are about 20 cm long. Cut the whole plant or pick continuously from the outside.	Tastiest fresh from the garden. Wash leaves, dry and place on a paper towel. Place and leaves in a plastic bag and store in the crisper for 7 to 10 days. Can withstand a light frost.
Lettuce (head)	70 days, depending on variety	Cut at soil level when plant reaches mature size indicated on seed packet.	Remove excess moisture by lying on paper towel for 15 minutes. Store head, unwashed in plastic bag in refrigerator for up to 7 days.

Lettuce (leaf)	45 to 60 days, depending on variety	Harvest leaves as soon as they are a usable size, on the day you will use them. Harvest oldest leaves first. Do not allow to flower.	Wash leaves thoroughly with cold water. Dry thoroughly. Put leaves into a plastic bag and remove air before sealing in refrigerator for up to 8 days.
Onions	Bunching: 60 to 100 days, depending on variety Bulb: 80 to 150 days, depending on variety	Pull bunching onions when they are size you will use. Harvest bulb onions about 10 to 12 days after the tops have flopped over. Dig out or pull up.	Bunching: Rinse immediately, blot dry and store in plastic bag for up to one month. Bulb: Lay onions to cure in a warm, dry place with good air flow but no direct sunlight. Mild onions should be used within 2 weeks. Strong onions should cure for four weeks. After the skins are crinkly store onions in a cool, dry place (10 to 15 degrees Celsius)
Peas	55 to 85 days, depending on variety	Harvest snow peas when pod is long and thin. Harvest snap and shell peas when pods are medium sized, plump but still green and tender.	Do not wash or shell. Place into a sealable plastic bag. Shell just before use.
Pepper (hot)	60 to 90 days, depending on variety	Harvest at peak colour for the variety. Wear gloves to harvest.	Will store in the crisper for a week. Thread together and hang to dry in a well-ventilated location and then store in a cool, dry location for one year.
Pepper (sweet)	70 to 90 days, depending on variety	Harvest when you are happy with the size and colour.	Brush off dirt and store in the refrigerator for up to seven days. Wash when you are ready to eat.
Potato	90 to 120 days, depending on variety	For potatoes to eat quickly dig up when flowers fall off. For potatoes to store, wait until the tops have dried up.	Brush dirt off, but do not get potatoes you are planning to store wet. Cure them in a warm, dark location for 10 to 14 days. Store in a dark box with ventilation holes at 0 to 5 degrees Celsius for several months.
Radish	20 to 45 days, depending on variety	Harvest when the top is a size you are happy with. Do not allow to flower.	Remove leaves and stems and wash well. Rinse in cold water. Line a sealable plastic bag with paper towels and drop in the wet radishes. Add more paper towel if there are quite a few radishes. Refrigerate for 1 week.

Raspberry	Depends on variety, July through October	Harvest when fruit is fully coloured and separates easily from the centre.	Best eaten fresh. Do not wash until you are ready to use them. Place in a single layer in the refrigerator with a paper towel over them.
Spinach	45 to 60 days, depending on variety	Pick leaves as soon as they are big enough to be usable. Harvest the whole plant when a seed stalk begins to form. Do not allow to flower.	Do not wash after picking, dry leaves and store in an airtight plastic bag with a paper towel. Refrigerate for up to three weeks.
Strawberry	Depends on variety, June through September	Harvest when fruits are uniformly red and beginning to soften. Pick leaving the green leafy cap and stem intact.	Best eaten fresh. Do not wash until you are ready to use them. Store in a single layer on a paper towel in the refrigerator for a couple of days.
Sweet Corn	70 to 105 days, depending on variety	Harvest when kernels are completely filled, leaking a milky sap when punctured. Silk will be dry and brown while husks are moist and green. Grasp ear, snap down and twist.	Store in the refrigerator with husks on in a plastic bag for up to three days.
Sweet Potato	100 to 125 days, depending on variety	Will grow until they are removed from the ground or the ground freezes. Pull at the size for your variety or at a size you are happy with.	Best eaten after about 6 weeks of curing. Brush off dirt and store in a warm, humid (26 degrees Celsius) place for eight days then store in a cool, dry (10 to 15 degrees Celsius) place for six weeks. Store in the cool, dry location for several months.
Tomato	70 to 90 days, depending on variety	Harvest when tomato is the right colour for the variety and fruit is firm, but not hard. Not quite ripe tomatoes will ripen in a warm, sunny window.	Do not refrigerate freshly picked tomatoes. Remove dirt with a damp cloth, but dry well before letting them sit on the counter. Use within three days.
Watermelon	80 to 100 days	Harvest when the “belly” turns from white to creamy yellow and the skin is dull rather than shiny.	Store in a cool, humid location for one to two weeks.
Zucchini	50 to 60 days, depending on variety	Pick when they are about 15 cm long and have the proper colouring. If left on the vine they will grow to monstrous sizes.	Do not wash until you are ready to use. Store in a plastic bag in the crisper for five days.

EXHIBITING THE HARVEST!

Events like agricultural fairs and horticultural shows offer gardeners an excellent opportunity to learn from others and share the accomplishments of the growing season.

Specific fairs and shows will often give exhibitor's guidelines for each category of produce, but general principles for exhibition include:

1) Quality and condition: specimens should be of edible maturity, neither green nor overripe; free of blemishes from disease, insects or harvest method; of uniform shape and colour, typical to the crop



- 2) Size: bigger is not necessarily better, medium to slightly above medium size is ideal, similar to what you would purchase at a market or grocery store; exception would be “largest” categories
- 3) Type: should be typical of the variety; exception would be “heirloom” or other unique categories.
- 4) Uniformity: when exhibiting multiple specimens they should be uniform in size, shape, colour, texture, quality, degree of maturity and presentation
- 5) Condition: specimens should be harvested and prepared as close to the exhibition date as possible and transported in a method to prevent wilting and shrivelling; they should be free of soil, dust and residues of sprays; avoid washing as it may dull the specimen or speed ripening

SELLING THE HARVEST!

Commercial growers follow similar guidelines to those listed above when they are preparing to sell their harvest at farmer's markets or roadside stands. They also aim to show off top quality produce at peak freshness and will often arrange their displays to accentuate the colour, shape and size of their crops.

Do It!

Activity: Show off the harvest.



In order to sell their crops commercial growers also engage in a variety of activities that are different from home gardeners. They grow crops in a much larger area and often grow a wide variety of the same crop so they can offer buyers produce over a longer period of time. For example sweet corn growers offer early, mid and late-season varieties to extend their sales season. Commercial growers often use a variety of machines in their operation, employ more people and may use pesticides and herbicides to control insects and weeds. They often have special buildings and equipment to store produce before it reaches the consumer.

Commercial growers also engage in a variety of business practices to ensure the success of their operation. Those selling directly to the public may advertise, use public relations tools like articles about their business, promotions like wagon rides into the pick-your-own patch or practise specific customer relations strategies. Other commercial growers will form relationships with produce wholesalers, grocery stores or food processors

Experience it!

Visit a farmer's market or grocery store and observe the different displays. What have growers/grocers done to draw attention to their produce?

Share it!

How many different ways could a commercially grown tomato reach the consumer?

AT HOME ACTIVITIES / DIGGING DEEPER!

1. Design an advertising, promotion and social media plan for a pick-your-own operation.
2. Set up a roadside stand and keep records on what produce is sold, the demand for each type of produce, expenses and method of advertising. Report results to the group assessing the success of the location and the type of produce sold.
3. Research food gleaning and share with the group. If there is a local food gleaning group in your community, volunteer to help with the harvest.
4. Organise and host a 'Summer Garden Party' in your home or community garden. Invite friends, family, members of the community garden, other 4-H clubs or youth groups, etc. Share the knowledge you have gained and the produce you have grown!

ACTIVITIES:

ACTIVITY #1

CARVE A ZUCCHINI

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– 1 large zucchini for each member; knives; small saws; other carving tools; spoons; newspaper for protecting surfaces; compost bucket(s) for cut out pieces; markers; tea lights (optional) <p>Instructions:</p> <ol style="list-style-type: none">1. Depending on the size of the zucchini and the preference of the member, the zucchini can be hollowed out like a pumpkin and then carved, or it can be carved without being hollowed out.2. Members can draw their designs on the zucchini first, or carve freehand.3. If the zucchini is hollowed out, a tea light can be placed inside the zucchini to illuminate the carving.
REFLECT	<p>Learning Outcomes:</p> <p>Members will enjoy a creative way to use overgrown or excess produce.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What are some other uses for zucchini?– What are some other things we could do with excess or overgrown produce?– What is the ideal size to harvest zucchini for eating?

ACTIVITY #2

MAKE BUMBLEBERRY FREEZER JAM

<https://www.todaysparent.com/recipe/side-dishes/bumbleberry-freezer-jam/>

DO	<p>Time: 60 minutes, plus setting time</p> <p>Materials/Resources:</p> <p>(Quantities are for six 250 ml containers of jam, increase as required for number of members)</p> <ul style="list-style-type: none">– Six clean freezer-safe 250 ml containers; approximately 8 cups of mixed berries (needs to make 4 firmly packed cups (1 litre) of mashed berries); 3 ¼ cups (800 ml) sugar; 1 package light pectin crystals; measuring cups; one large and two small bowls; potato masher; mixing spoons <p>Instructions:</p> <ol style="list-style-type: none">1. Measure the sugar into a bowl.2. Remove ¼ cup (50 ml) of the sugar and put it in different bowl along with the pectin crystals. Stir the sugar and pectin crystals together. Set both bowls aside.2. In a large bowl mash the berries. Make sure you have 4 firmly packed cups (1 litre) of berries.3. Add the pectin mixture to the berries and stir until combined, then let sit at room temperature for about 30 minutes, stirring once or twice. It will be thick and goeey.4. Add the remaining sugar to the berries and stir constantly for three minutes.5. Pack into freezer-safe 250 ml containers, leaving at least 5 millimetres (1/4 inch) on top to allow for expansion when frozen. Cover with lids and let jam stand at room temperature for several hours or overnight until set. Place in freezer for up to one year or in refrigerator if you will be using within three weeks.
REFLECT	<p>Learning Outcomes:</p> <p>Members will learn one method of storing/preserving the harvest and have a container of jam to enjoy.</p>

APPLY

Processing Prompts:

- What other ways could we eat/prepare the berries from our garden site?
- What other berries, fruits or other crops might make for a tasty combination in jam?
- Why is it important to use the jam within one year of freezing or three weeks of refrigerating?

ACTIVITY #3

MAKE VEGETABLE KEBABS

DO	<p>Time: 30 minutes (not including soaking time)</p> <p>Materials/Resources:</p> <p>One or two metal or wooden skewers per member; water and soaking bowl if using wooden skewers; variety of vegetables and herbs (i.e. vegetables: baby corn, bell pepper, cherry tomato, eggplant, onion, summer squash, etc. Herbs: basil, cilantro, dill, mint, oregano, parsley, etc.); knife/knives; olive oil; bowl(s); basting brush(es); barbecue or oven</p> <p>Instructions:</p> <ol style="list-style-type: none">1. If using wooden skewers soak in water for 30 minutes before threading with vegetables.2. Cut vegetables into 2.5 centimetre (1 inch) chunks.3. Chop herbs finely and mix each herb with small quantity of olive oil.4. Thread skewers with vegetables. Baste each skewer well with choice of herb and olive oil mixture.5. Place kebabs onto a grill pan, barbecue or under the broiler in the oven. Watch carefully and turn a few times (optional: baste occasionally) while cooking, so that vegetables are evenly tender, approximately 10 to 15 minutes.
REFLECT	<p>Learning Outcomes:</p> <p>Members will learn one method for enjoying the vegetable harvest.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What vegetable combination did you use? What combination would you use next time?– What herb did you choose? What herb would you use next time?– What other ways could we eat/prepare the vegetables from our garden site?

ACTIVITY 4
SHOW OFF THE HARVEST

<p>DO</p>	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – Selected fruits and vegetables from the garden site; table(s) for exhibiting <p>Instructions:</p> <ol style="list-style-type: none"> 1. Either from the attached list or from the group’s own ideas choose several exhibition categories and ask members to bring their produce ready to exhibit. 2. Have members display their produce specimens by category on the table(s). 3. Either in small groups, or as one large group move along the table and assess each exhibit according to the stated criteria. Provide positive feedback to exhibitors. (Alternate: invite a local gardener or horticulturist to serve as the “judge” and to provide perspective on the process). 4. Eat the exhibits!
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will gain experience exhibiting their produce.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Is it difficult to judge produce? What categories were easiest/hardest to judge? – Do you think a commercial grower would have made a different choice of produce to show off to their customers or have made different evaluations? – Does it matter how produce looks?

SAMPLE EXHIBITION CATEGORIES:

Class 1: Cucumber, two, field variety

Class 2: Carrots, three, with 2 centimetre tops

Class 3: Beets, three, with 2 centimetre tops

Class 4: Sweet peppers, three, any variety

Class 5: Cherry tomatoes, five, on stems, any variety

Class 6: Red tomatoes, three, any variety

Class 7: Sweet corn, three ears, husked, any variety

Class 8: Greens, two, any variety, roots on

Class 9: Herbs, three types, in one clear glass container with water

Class 10: Apples, three, any variety

Class 11: Grapes, one bunch, any variety

Class 12: Berries, one pint, any variety

Class 13: Tallest stalk of corn, one, root intact

Class 14: Largest zucchini, one

Class 15: Longest cucumber, one

Class 16: Longest bean, one, green or yellow

Class 17: Oddest shaped vegetable

UNIT J: HARVESTING AND PRESERVING PRODUCE

SETTING OBJECTIVES:

The harvest season extends for many weeks through the growing season, and it can be difficult to consume everything our garden grows. Fortunately, there are a wide variety of ways to preserve fruits, vegetables and herbs.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members have explored a variety of methods to preserve the harvest.
- Members understand the importance of using the best quality produce for preserving.
- Members have learned about saving seeds.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Freezing and drying produce
- Fermenting and pickling produce
- Canning produce
- Seed saving

ACTIVITIES:

1. Build a cardboard solar food dryer
2. Make refrigerator pickled vegetables
3. Make garden salsa
4. Save pepper seeds

Sample Meeting Agenda Time: 3 hours 55 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Preserving Produce – freezing - drying	20 min
Activity	Activity #1: Build a cardboard solar food dryer	60 min
Topic Information	Preserving Produce – fermenting - pickling	20 min
Activity	Activity #2: Make refrigerator pickled vegetables	20 min
Topic Information	Preserving Produce – canning	10 min
Activity	Activity #3: Make garden salsa	40 min
Topic Information	Seed Saving	10 min
Activity	Activity #4: Save pepper seeds	15 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

FREEZING AND DRYING PRODUCE

Even when gardeners plan carefully, choosing early and later maturing varieties, and employ a variety of planting techniques, for example consecutive planting and succession planting, there often comes a point during the growing season when we cannot consume all that the garden is producing. Fortunately, there are a wide variety of ways to preserve what we grow, including canning, drying, fermenting, freezing, and pickling.

FREEZING:

Freezing is one of the easiest ways to preserve the harvest. You can freeze most fruits and vegetables and nearly all herbs. Start with the freshest produce possible. If any of the produce has started to decay, do not freeze it.

Many vegetables require blanching, which means boiling briefly and then plunging into cold water to halt the cooking process, before freezing. There are many books and online resources that will tell you exactly how long to blanch each type of vegetable. Onions, peppers, tomatoes (whole, sliced or diced) and grated zucchini do not need to be blanched.

Many kinds of fruit can be frozen as is, while others need their skin or peel removed and to be chopped into smaller pieces. Some fruits benefit from a sprinkle of sugar to keep them from turning brown.

Most herbs can be frozen as a whole leaf, blended with a small amount of olive oil to make a slurry and then poured into ice cube trays to freeze, or frozen with water in ice cube trays.

DRYING:

Drying is another relatively easy way to preserve many fruits and vegetables and most herbs. Crops can be sun dried, air dried, oven dried or dried using an electric food dehydrator.

Foods with a high sugar content, including fruits and some tomatoes, are safe to dry in the sun. Sun drying requires a minimum temperature of 30 degrees Celsius (86 degrees Fahrenheit) and low humidity, 60 per cent or less, for several days. To ensure there are no insects or insect eggs on sun dried food, once drying is complete seal the food in freezer-type bags and place in a freezer for 48 hours or place food in a single layer on a pan in an oven preheated to 70 degrees Celsius (160 degrees Fahrenheit) and bake for 30 minutes.

Herbs are the best candidate for air drying. Water a few hours before you plan to harvest the herbs, cut stems long enough so they can be tied together, and make sure they are free of dirt and insects. Tie the stems together with an elastic band or twine and then hang the bundle upside down in a dark, warm, well-ventilated location. Once the leaves are dry, remove the stems, chop the leaves and store them away from light and moisture.

Look it up!

To learn how to freeze your crop visit the National Centre for Home Food Preservation <https://nchfp.uga.edu/how/freeze.html>

Do It!

Activity: Build a cardboard solar food dryer.

You can use your oven to dry food if it has a dehydrate setting or the temperature can be set at 60 degrees Celsius (140 degrees Fahrenheit). A higher temperature will cook, rather than dry the food. If your oven has a convection fan the drying time will be reduced. Rotate trays from



top to bottom and front to back and keep an eye on things to prevent scorching food.

Food dehydrators are the most efficient way to dry food, commonly cutting drying time in half. Follow the manufacturer's instructions for preparing the food, rotating trays and establishing drying times.

Once it has been dried, food needs to be conditioned before it is packed for long term storage. Condition dried food by packing it loosely, about 2/3 full, into glass or plastic jars. Seal the containers and let them stand for seven to 10 days. Shake each container every day to loosen the pieces and check for condensation. If moisture appears inside the containers, the food requires additional drying. Once it has been conditioned dried food can be stored in a cool, dry, dark place or in the freezer.

FERMENTING:

Fermentation is one of the oldest ways to preserve food. It is a metabolic process that converts sugars and carbohydrates to acids, gases or alcohol, which preserve the food. It usually happens in oxygen-free (anaerobic) conditions and the conversion involves desirable microorganisms. Cheddar cheese, yogurt, sour cream, coffee, chocolate, vinegar, sauerkraut, sour-dough bread and salt-cured meat are all created by fermentation. Salt is an essential ingredient in fermentation, helping to prevent the growth of undesirable bacteria.

Crops like cabbage, radishes, turnips, parsnips and green tomatoes can all be fermented. Be sure to start with fresh, crisp produce and follow recipes carefully to prevent the possibility of spoilage.

PICKLING:

Pickling is another ancient preservation technique which involves soaking crops in brine (salt or

Look it up!

For more information about drying fruits and vegetables visit the National Centre for Home Food Preservation http://nchfp.uga.edu/publications/uga_dry_fruit.pdf

Look it up!

Find fermentation recipes for your crops online.



salty water) or an acid like vinegar or lemon juice.

A variety of fruits and vegetables, including asparagus, beans, beets, cabbage, carrots, cauliflower, corn, cucumbers, garlic, melons, okra, onions, peppers, summer squash and tomatoes, can be pickled, and many herbs add delicious flavour to the pickling brine.

As with all preserving methods, start with fresh, crisp produce and use canning, pickling or kosher salt specifically designed for this process. Follow recipes carefully and do not alter the proportions of vinegar to food to water. You can extend the shelf-life of pickled foods by sealing them in a boiling water bath (see Canning section for more information) or make refrigerator versions that will keep for three or four months.

Do It!

Activity: Make refrigerator pickled vegetables.



CANNING:

Home canning is the practice of preserving foods in glass jars. It involves processing the jars in a boiling water bath or a pressure canner to destroy micro-organisms that could cause food to spoil and to drive air out of the jar to form a vacuum seal — keeping food in and air and micro-organisms out.

A wide variety of fruits and vegetables can be canned. High-acid foods like tomatoes, fruit and

vegetable salsas, relishes, pickles, jams, jellies and fruits can be preserved in a boiling water bath (100 degrees Celsius/212 degrees Fahrenheit at sea level). Low-acid foods including most vegetables, meat, poultry and seafood must be canned using a pressure canner which achieves a minimum temperature of 115 degrees Celsius (240 degrees Fahrenheit).

Store canned goods in a cool, dark, dry location, ideally at temperatures between 10 and 20 degrees Celsius (50 to 70 degrees Fahrenheit). Label and date all jars and eat within one year. Do not eat food from a jar which does not have a tightly sealed lid and make sure to inspect the contents of each jar upon opening as improper storage could accelerate spoilage.

Follow recipes carefully and use tested processing methods to ensure the safety of your canned produce. Detailed information about safe canning practices is available at <http://www.omafra.gov.on.ca/english/food/inspection/botulism-2011.htm>.

SEED SAVING:

Another way to preserve part of the harvest is to save seeds for next year's garden. Tomatoes, peppers, beans and peas are good choices for seed saving. These crops are self-pollinating and the seeds do not require any special treatment before being stored for the winter.

To save seeds, choose open pollinated varieties rather than hybrids. Choose the most healthy, vigorous plants with the best tasting fruits as the providers, or parents, for your seeds.

Harvesting tomato seeds: After the fruits have fully ripened squeeze or scoop out the seeds, and the gel around them, before you eat or cook the tomatoes. Place the seeds and the gel in a glass jar with some water and cover it with a paper towel or piece of cheesecloth to keep the fruit flies away. Swirl the mixture twice a day. The mixture will ferment, developing a layer of mould on top and the viable tomato seeds should sink to the bottom within five days. Pour the liquid out, rinse the seeds well and spread them on a paper plate to dry. Give the plate a gentle shake or stir each day to make sure they dry on all sides



Look it up!

Watch a video about home canning and find home canning recipes for your crops online.

Do It!

Activity: Make garden salsa.

and do not clump together. Once the seeds are completely dry, store them in an air tight container in a cool, dry location. Label the container with the variety of seed and the date.

Harvesting pepper seeds: Allow peppers to ripen on the vine until they start to wrinkle around the stem. Remove the seeds from the peppers and spread them on a paper plate to dry. Once the seeds are completely dry, store them in

an air tight container in a cool, dry location. Label the container with the variety of seed and the date.

Harvesting pea and bean seeds: Allow peas and beans to ripen on the vine until they are dry and starting to turn brown with the seeds rattling inside the pods, about four to six weeks after peak harvest. Pick the pods from the plants and spread them out to dry completely indoors. After approximately two weeks you can remove the seeds from the pods, or they can be left in the pods until planting time. Once the pods/seeds are completely dry, store them in an air tight container in a cool, dry location. Label the container with the variety of seed and the date.

Do It!

Activity: Save pepper seeds.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Choose one crop and preserve it in at least three different ways. For example, strawberries can be dried, frozen and made into jam.
2. Design a harvest dinner, selecting recipes for appetizers, main course, side dishes and dessert that feature crops, fresh or preserved, from the garden site.
3. Research, design and build a solar food dehydrator.

ACTIVITIES:

ACTIVITY 1

BUILD A CARDBOARD SOLAR FOOD DRYER

<https://www.motherearthnews.com/diy/solar-food-dryer-zmaz81jtzraw>

DO

Time: 60 minutes

Materials/Resources (for one solar food dryer):

- One long, shallow rectangular cardboard box; one taller rectangular box; scissors and/or utility knife; black paint or black plastic; clear plastic; duct tape; cheesecloth (large enough to fit over the taller rectangular box two times)

Instructions:

1. Cut the top off the long, shallow rectangular box. Keep the extra cardboard.
2. Cut three or four holes in each of the short sides of the long, shallow rectangular box.
3. Paint the inside of the long, shallow rectangular box or line it with black plastic.
4. Cover the top of the long, shallow box with clear plastic, tape in place. This is the heating unit.
5. Measure five centimetres (two inches) below the top of the taller rectangular box and draw a line all the way around the box. Cut along the line.
6. Using the five centimetre (two inch) tall piece, measure five centimetres (two inches) around the inner edge of the top of the box and cut around this line so that you have a five centimetre (two inch) tall piece that has a five centimetre (two inch) inner frame around the top. Keep the extra cardboard.
7. Stretch the cheese cloth across the top of the inner frame and tape along the sides so that it is secure, cutting to fit. This is the drying tray.
8. Using the taller rectangular box, cut three or four holes in one of the long sides. This is the drying box.
9. Place the taller rectangular drying box on a table or chair so that the holes face the front. Lean the long, shallow rectangular box or heating unit from the ground up to the front of the taller rectangular box. Using the extra cardboard, attach the long, shallow box to the taller box with duct tape so that air can flow directly from the heating unit into the drying box without escaping.
10. Insert the cheese cloth frame or drying tray into the drying box and fasten with tape so that it is approximately five centimetres (two inches) below the top edge of the drying box, but above the air holes.
11. Place food to be dried on the drying tray and cover the drying box with the remaining cheesecloth to keep insects away. Fasten with tape.

REFLECT	Learning Outcomes: Members will build a simple solar food dryer and have an opportunity to dry some of their crops.
APPLY	Processing Prompts: <ul style="list-style-type: none">– What other materials could we build a solar food dryer out of?– What are some of the challenges we may face drying our crops?– What crops do you think will work best in the solar food dryer?

ACTIVITY 2

MAKE REFRIGERATOR PICKLED VEGETABLES

<https://bonnieplants.com/wp-content/uploads/Bonnie-Preserve-Your-Harvest.pdf>

DO	<p>Time: 20 minutes</p> <p>Materials/Resources (recipe is for two litres/quarts, increase quantities to reflect number of participants):</p> <ul style="list-style-type: none">– 4 cups water; 2 cups white vinegar; 6 teaspoons kosher salt; 4 fresh sprigs dill; 1 teaspoon celery seed; 1 teaspoon coriander seed; 1 teaspoon mustard seed; 3 to 4 cups of cucumber spears, cauliflower florets, summer squash spears or whole okra; 2 clean 1 litre (1 quart) glass jars with lids (or four 500 ml); large saucepan; spoon <p>Instructions:</p> <ol style="list-style-type: none">1. In a large pan create a brine by bringing water, vinegar and salt to a boil. Stir until salt dissolves. Remove from heat and set aside.2. Drop one or two sprigs of dill into each of the glass jars. Distribute the celery, coriander and mustard seeds evenly between the jars. Stuff each jar with the vegetables until well packed.3. Pour the brine over the vegetables, covering completely. Allow to cool, then place the lids on the jars and refrigerate for at least 3 hours before serving.4. The flavour will seep into the vegetables the longer they sit and they will keep for three to four months refrigerated.
REFLECT	<p>Learning Outcomes:</p> <p>Members will learn a simple pickling recipe and enjoy pickled vegetables from the garden.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What other herbs might taste good with these pickles?– What other crops could we pickle using this recipe?– How could we extend the length of time that pickles would keep? (Note: this specific recipe would need to be altered to be canned)

ACTIVITY #3
MAKE GARDEN SALSA

<p>DO</p>	<p>Time: 40 minutes</p> <p>Materials/Resources (recipe feeds approximately 20):</p> <ul style="list-style-type: none"> – 1.5 kilograms (3 pounds) of large tomatoes or 1 kilogram (4 pints) pints of small tomatoes; two or three sweet peppers of any colour; two bunches of green onions or one sweet onion; one bunch of cilantro; salt and pepper to taste; 3 garlic cloves (optional); three or four limes (optional) <p>Instructions:</p> <ol style="list-style-type: none"> 1. Wash tomatoes, peppers, green onions and cilantro, peel garlic and onion, if using. 2. Crush garlic, if using, chop cilantro finely and chop tomatoes, peppers and onions in small pieces. 3. Mix vegetables and herbs together in a large bowl. 4. Season with salt and pepper. If using, squeeze lime juice over the salsa. 5. Mix well and serve with tortilla chips. Leftover salsa can be kept in the refrigerator for a few days.
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will learn a recipe that draws almost all of its ingredients from the garden.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – What other ingredients could you add to garden salsa? – How else could you serve garden salsa? – How could we extend the length of time that salsa would keep? (Note: this specific recipe would need to be altered to be canned)

ACTIVITY #4
SAVE PEPPER SEEDS

<p>DO</p>	<p>Time: 15 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none"> – One fully ripe (starting to wrinkle by the stem) non-hybrid pepper for each member; knife or spoon for each member; paper plate for each member; plastic bag for each member to cover plate for transport; small glass container for each member; permanent markers <p>Instructions:</p> <ol style="list-style-type: none"> 1. Cut the bottom off the pepper and scrape or scoop out all the seeds onto the paper plate. Spread them out into a single layer. Insert the plate in a plastic bag when it is time to transport the plate, remove the bag at home. 2. Write the type of seed and the date on the glass container, which will store the pepper seeds after they have dried completely, approximately two weeks. Store the container of seeds in a cool, dry place until spring. 3. Eat the peppers!
<p>REFLECT</p>	<p>Learning Outcomes:</p> <p>Members will learn how to save the seeds from a pepper to use in the garden next year.</p>
<p>APPLY</p>	<p>Processing Prompts:</p> <ul style="list-style-type: none"> – Why do you think it is important to use only seeds from open-pollinated, or non-hybrid, plants? – Why do you think it is important to store the seeds in a cool, dry place? – What are the advantages to saving seeds?

UNIT K: SOIL TESTING AND AMENDMENT

SETTING OBJECTIVES:

Once the harvest season begins to wind down it is time to start thinking about next year's gardening season. Clearing away old plants, assessing what grew well and what challenges were faced, and then adding key nutrients to the soil can all help prepare the garden site for future success.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members have evaluated the garden and considered improvements that can be made for coming years.
- Members have learned about soil testing for pH and macro and micronutrients.
- Members understand the importance of amending the soil and have considered a variety of ways to add organic matter to the soil including planting a cover crop.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Fall garden clean-up and evaluation
- Soil testing, including pH, macro and micronutrients
- Soil amendment ***and cover crops***

ACTIVITIES:

1. Update your garden journal
2. Perform a simple soil test
3. Play garden jeopardy!

Sample Meeting Agenda Time: 2 hours 40 minutes

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Activity	Activity #1: Update your garden journal	30 min
Topic Information	Insects, weeds and other challenges Soil testing and fertilizing	20 min
Activity	Activity #2: Perform a simple soil test	20 min
Topic Information	Soil amendments and cover crops	20 min
Activity	Activity #3: Play garden jeopardy!	20 min
Topic Information	Watering – be water-wise	10 min
At Home Activities / Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

SOIL TESTING AND AMENDMENT

As the demands of harvest season begin to slow it is an excellent time to consider the garden's highlights and disappointments. Did some plants flourish and others fail to fruit? Were any plants affected by insects or disease? Were any weeds a particular nuisance? Asking these questions and others can tell gardeners a great deal about the growing conditions at their site and help guide soil amendments, plans for additional garden structures and planting ideas for future seasons.

As healthy plants finish producing remove them from the garden and add them to your compost pile. If plants suffered from disease or insect infestation through the growing season remove them from the garden and put them in the garbage to prevent the disease from spreading or the insects from lingering in the garden.

Do It!

Activity: Update your garden journal.

INSECTS, WEEDS AND OTHER CHALLENGES:

- If insects were a challenge in the garden site, it can be helpful to turn over the soil and expose insects and insect larvae that were hoping to spend the winter under the soil.
- If any areas of the garden site suffered from a heavy weed infestation, covering the area with black plastic or cardboard and leaving it in place until spring can help kill off weed seeds.
- If wind proved to be a problem at the garden site, the fall is a good time to plant or build a wind break.
- If plants outgrew the space they were allotted in the garden site, the fall and winter are a good time to build additional garden supports to help plants grow up rather than out.

SOIL TESTING AND FERTILIZING:

The fall is good time to perform soil tests. For a professional assessment, the Ontario Ministry of Agriculture, Food and Rural Affairs maintains a list of soil testing laboratories at <http://www.omafra.gov.on.ca>, or you can purchase a soil testing kit at a garden centre or hardware store. 4-H Ontario also has soil kits that can be borrowed from the provincial office.

A soil test will indicate if you have acidic (below 7.0 pH), neutral (7.0 pH) or alkaline soil (above 7.0 pH). Most plants like a soil between 6.5 and 7.0 pH. The weeds that appeared in your garden site can also give you an idea of the pH of your soil.

Experience It!

Invite someone from OMAFRA, a local greenhouse or a local crop supply company to your meeting to demonstrate how to properly test soil.

Weeds that like acidic soils: meadow foxtails, daisies, mouse-ear hawkweed, corn marigold or corn chrysanthemum, corn spurry, sheep sorrel, sow thistle, coltsfoot, nettles and masses of Johnny-jump-ups

Weeds that like alkaline soils: white mustard, clustered bellflower, musk thistle, black

knapweed, Queen Anne's lace, salad burnet and henbane.

You can reduce the acidity of soil by adding dolomitic limestone in the fall after the ground has been tilled. To reduce the alkalinity of soil you can add sulphur, calcium sulphate or aluminum nitrate or 5 to 7.5 centimetres (2 to 3 inches) of compost.



A soil test can also measure the levels of some macro and micronutrients in the soil. The three major elements that plants require in soil are nitrogen, phosphorous and potassium. Other major elements in the soil are carbon, hydrogen, oxygen, calcium, magnesium and iron. There are also trace elements including boron, copper, manganese, zinc, molybdenum, sulphur and zinc. The key to healthy soil and, thereby, healthy plants is to maintain a balance of all these nutrients.

Do It!

Activity: Perform a simple soil test.

Gardeners influence the balance of the three major elements through the addition of organic or synthetic fertilisers. The three numbers you see on a fertiliser label (i.e. 5-6-5) tell you the proportion, by weight, of Nitrogen (5), Phosphorous (6) and Potassium (5) in the product. Each element plays a different role in the growth and development of plants.

- Nitrogen:
- essential for the growth of leaves and stems
 - lack of nitrogen can result in pale and sickly looking plants, while too much nitrogen can cause plants to produce lots of greenery and no blossoms or fruit
 - organic sources of nitrogen include fish emulsion, blood meal, composted manure, compost

- Phosphorous:
- essential for root development and flowering
 - an imbalance in phosphorous can stunt plant growth and cause

abnormal colouration

- organic sources of phosphorous include colloidal phosphate, rock phosphate, superphosphate, bone meal, manure

- Potassium:
- essential for root development and general plant health
 - an imbalance in potassium can cause brown, curling leaves, undersized fruit and weak stems
 - organic sources of potassium include wood ashes (from the fireplace), composted manure, straw and bananas

SOIL AMENDMENTS AND COVER CROPS:

The fall is also an excellent time to amend, or add organic matter to, the soil. Preparing the soil in the fall gets seeds into the ground earlier in the spring!

Adding organic matter to garden soil improves the soil structure, enhances the soil's ability to hold nutrients, improves both drainage and the ability to hold moisture, adds nutrients, and increases biological activity in the soil. You can amend soil with compost you have made, composted manure, mushroom compost, worm castings, leaf mould or bagged organic fertilizer.

Raw manure is another source of nutrients for the soil, and fall is the time to apply it to your garden. There should be at least four months between the application of raw manure on the fruit and vegetable garden and harvest of the crops. Be sure to work the manure into the soil and keep it away from the edible parts of perennial plants like rhubarb and asparagus.

Another way to amend the soil is by planting a cover crop. Cover crops can reduce winter soil erosion, add organic material to the soil when turned under in the spring, improve

Judge It!

Place four soil samples in a row and number them 1 to 4. Have members place the soils in order from most to least desirable based on which soil is most suitable for their garden.



the soil quality, and add nutrients to the soil. Among the most popular cover crops for vegetable gardeners are buckwheat, oats, rye, winter wheat, crimson clover, field peas and hairy vetch. More information about various cover crops is available on the Ontario Ministry of Agriculture, Food and Rural Affairs website http://www.omafra.gov.on.ca/english/crops/facts/cover_crops01/cover_types.htm.

Cover crops can be planted as early as August 15 and up until four weeks before the average frost date in your growing area. To plant a cover crop, rake the soil smooth and broadcast the seeds across the area according to the directions on the seed packet. Rake again to incorporate the seeds into the soil and lightly water the area. Cut the plants down in the spring before they begin to flower using hand clippers, a string trimmer or mower. Once the plants have been cut down, turn them into the soil with a shovel, garden fork or rototiller. Give the cover crop two or three weeks to begin decomposing and then plant the garden as usual.

Do It!

Activity: Play garden jeopardy!

AT HOME ACTIVITIES/DIGGING DEEPER!

4. Research cover crops and choose up to three to seed in different areas of the garden site. Evaluate the effectiveness and ease of use of each cover crop.
5. Complete a thorough evaluation of the garden's successes and disappointments. Consider ways to increase the harvest, prevent diseases and ward off insects and weeds in future years.
6. Research the crops that can be harvested in late fall in your growing zone. Plant at least three crops and attempt to extend the growing season through the use of hot caps, row covers, cold frames, etc. Keep detailed records of the process.

ACTIVITIES:

ACTIVITY #1

UPDATE YOUR GARDEN JOURNAL

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Each member’s garden journal; plastic photo sleeves; three-hole punched blank paper; lined paper and graph paper; permanent markers; colouring markers or pencils <p>Instructions:</p> <ol style="list-style-type: none">1. Update the garden journal with notes on the plastic photo sleeves or calendar pages about harvest information.2. Add photographs of the harvest, recipes for meals or preserves prepared with the crops, etc.3. Add information about fall soil amendments and/or cover crops planted.4. Members can add any other notes, sketches, photographs, etc. that they have created or collected during their gardening journey.
REFLECT	<p>Learning Outcomes:</p> <p>Members will have an updated record of their garden that will serve as an excellent reference for the coming years.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What did you add to your garden journal?– What is your favourite garden memory? Your least favourite garden memory?– What do you think you would/will do differently next year?

ACTIVITY #2

PERFORM A SIMPLE SOIL TEST

[HTTPS://WWW.THEBALANCE.COM/HOW-TO-TEST-SOIL-ACIDITY-ALKALINITY-WITHOUT-A-TEST-KIT-1388584](https://www.thebalance.com/how-to-test-soil-acidity-alkalinity-without-a-test-kit-1388584)

DO	<p>Time: 20 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– Soil sample from the garden site(s); white vinegar; baking soda; water; two containers to use in the testing; utensil for mixing soil and water, optional: store bought pH test <p>Instructions:</p> <ol style="list-style-type: none">1. Divide the soil sample evenly into the two containers.2. Pour ½ cup vinegar into the first soil sample container. If the soil bubbles or fizzes you have alkaline soil. The fizzing or bubbling reaction is caused by the acidic vinegar coming into contact with the alkaline soil. If there was no reaction continue to Step 3.3. Pour ½ cup water into the second soil sample container and mix with the soil. Add ½ cup baking soda to the soil and water mixture. If the soil bubbles or fizzes you have highly acidic soil. The reaction is caused by the acidic soil coming into contact with the alkaline baking soda.4. If there is no reaction to either test your soil has a neutral pH.5. Optional: Complete a pH test with a kit from a garden centre or hardware store and compare the results with the above tests.
REFLECT	<p>Learning Outcomes:</p> <p>Members will learn a simple method to assess the pH of garden soil.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What can we do if our soil is acidic?– What can we do if our soil is alkaline?– Why is it helpful to understand the pH level of your garden soil?

ACTIVITY # 3 PLAY GARDEN JEOPARDY!

DO

Time: 20 minutes

Materials/Resources:

- Jeopardy board (on black/white board, poster paper, computer or other), Jeopardy cards with questions and answers (use attached, or create new cards), scoreboard (on black/white board, poster paper, computer or other), markers/chalk to write on scoreboard, paper, pencils/pens.

Instructions:

1. Prepare Jeopardy board on whichever medium works best for the group (see sample below). Prepare Jeopardy cards (attached). Prepare scoreboard.
2. Divide members into two to four teams. Ask them to determine the order in which each member will play, for example who will make the first selection, the second selection, etc.
3. Introduce/read aloud the name of each category. Explain that all answers for category MMMM will begin with the letter M. Note that members can choose from any category and any point value on their turn, for example “Vegetables for 10 points” and that their answers should be posed in the form of a question, for example, “What is a carrot?”
4. Ask the first player from Team 1 to choose a category and point value. Read the answer from the corresponding Jeopardy card. The member will respond in the form of a question. If their response is correct that team is awarded the corresponding points. No points are awarded or subtracted for an incorrect response. Once a card has been used, remove it from the board.
5. Ask the first player from Team 2 to choose a category and follow the steps above. Once the first player from each team has made a choice, repeat Step 4 for each second and subsequent player on each team.
6. Once all of the cards have been used, tally the points. Teams may wager some or all of their points on Final Jeopardy. Give each team a piece of paper and pen/pencil to write down their wager and Final Jeopardy response.
7. Read the Final Jeopardy category. Ask teams to work together to decide on a wager and write it down on the paper provided.
8. Read the Final Jeopardy answer. Ask teams to work together to come up with a response and write it down on the paper provided.
9. Ask Team 1 to show their Final Jeopardy response and their wager. Read both aloud. Repeat for each team.
10. Tally each team’s final points; successful wagers are added to their initial total, unsuccessful wagers subtracted. The team with the most points is the Jeopardy winner!

REFLECT

Learning Outcomes:

Members will have an opportunity to solidify and share the knowledge they have gained throughout the Let's Get Growing program.

APPLY

Processing Prompts:

- Which category was the most difficult? Why?
- Did the game remind you of information you learned during the Let's Get Growing program?
- If you were going to play again, would your team change its strategy during regular or Final Jeopardy?

LET'S GET GROWING JEOPARDY!

Fruits	Vegetables	Herbs	Pests	Potpourri	MMMM
5	5	5	5	5	5
10	10	10	10	10	10
15	15	15	15	15	15
20	20	20	20	20	20
25	25	25	25	25	25

FINAL JEOPARDY

<p>Grapes and melons both grow on these.</p> <p><u>Answer:</u> What are vines?</p>	<p>Three tree fruits that start with the letter “P”.</p> <p><u>Answer:</u> What are plum, peach and pear?</p>
<p>Strawberry plants are covered with straw in the winter for this reason.</p> <p><u>Answer:</u> What is to protect them from the cold?</p>	<p>A self-fruited tree can produce fruit without this.</p> <p><u>Answer:</u> What is pollination?</p>
<p>Blueberries need a soil with a low pH, which is called this.</p> <p><u>Answer:</u> What is acidic soil?</p>	<p>A plant, like asparagus, which grows for more than one season is called this.</p> <p><u>Answer:</u> What is a perennial?</p>
<p>A vegetable garden site should have at least this many hours of sun — four, six or eight.</p> <p><u>Answer:</u> What is six?</p>	<p>Of corn, cucumbers and tomatoes, these two have varieties that can be planted in small spaces.</p> <p><u>Answer:</u> What are cucumbers and tomatoes?</p>
<p>Squash should be at this stage of maturity when harvested.</p> <p><u>Answer:</u> What is fully ripe?</p>	<p>The benefit of planting seedlings rather than directly sowing seeds into the garden.</p> <p><u>Answer:</u> What is the crop will mature earlier?</p>

The parts of caraway and poppy plants that are used in baking.

Answer: What are seeds?

Herbs taste stronger when they are which of these, dried or fresh.

Answer: What is dried?

FRUITS FOR 10	FRUITS FOR 5
FRUITS FOR 20	FRUITS FOR 15
VEGETABLES FOR 5	FRUITS FOR 2 ₅
VEGETABLES FOR 15	VEGETABLES FOR 10
VEGETABLES FOR 25	VEGETABLES FOR 20
HERBS FOR 10	HERBS FOR 5

<p>Chamomile, mint and rose hips may be used to flavour this.</p> <p><u>Answer:</u> What is tea?</p>	<p>This herb is a favourite of home canners.</p> <p><u>Answer:</u> What is dill?</p>
<p>Growing herbs indoors is one way to enjoy homegrown herbs through the winter. Name two other ways.</p> <p><u>Answer:</u> What are drying and freezing?</p>	<p>A plant growing where it is not wanted.</p> <p><u>Answer:</u> What is a weed?</p>
<p>An eater of many garden berries</p> <p><u>Answer:</u> What is a bird?</p>	<p>This garden problem is often made worse by damp weather.</p> <p><u>Answer:</u> What is plant disease?</p>
<p>An insect that destroys other garden pests is called this.</p> <p><u>Answer:</u> What is a beneficial insect?</p>	<p>In a home garden, this is the best defense against common garden problems.</p> <p><u>Answer:</u> What is healthy soil?</p>
<p>Plants prefer a good supply of this in hot weather.</p> <p><u>Answer:</u> What is water?</p>	<p>A tool used to cut raspberry canes.</p> <p><u>Answer:</u> What is a pruner?</p>

A plant that can survive temperatures as low as minus four degrees Celsius is called this.

Answer: What is frost hardy?

When you eat broccoli you are eating this part of the plant.

Answer: What are the flowers?

HERBS FOR 20	HERBS FOR 15
PESTS FOR 5	HERBS FOR 25
PESTS FOR 15	PESTS FOR 10
PESTS FOR 25	PESTS FOR 20
POTPOURRI FOR 10	POTPOURRI FOR 5
POTPOURRI FOR 20	POTPOURRI FOR 15

<p>When exhibiting, produce should be uniform in these three areas.</p> <p><u>Answer:</u> What are shape, size and colour?</p>	<p>Natural fertilizer.</p> <p><u>Answer:</u> What is manure?</p>
<p>Growers can sell their produce at these locations.</p> <p><u>Answer:</u> What are markets?</p>	<p>Fully ripe produce.</p> <p><u>Answer:</u> What is mature?</p>
<p>Fresh fruits and vegetables are a good source of vitamins and these.</p> <p><u>Answer:</u> What are minerals?</p>	<p>A layer of material applied to the surface of the soil.</p> <p><u>Answer:</u> What is mulch?</p>
<p>Final Jeopardy</p> <p><u>Category:</u> Geography</p>	<p>The Canadian province which produces the most fruit and vegetables.</p> <p><u>Answer:</u> What is Ontario?</p>

MMMM FOR 5	POTPOURRI FOR 25
MMMM FOR 15	MMMM FOR 10
MMMM FOR 25	MMMM FOR 20
FINAL JEOPARDY	FINAL JEOPARDY

UNIT L: FALL PLANTING AND READYING PLANTS FOR WINTER

SETTING OBJECTIVES:

Making sure perennial crops, trees and shrubs are ready for winter will help ensure their health in the coming growing season. The life of containers and garden tools will also be extended with a bit of care at the end of the growing season.

Suggested Lesson Outcomes

You and your members may choose one, several, all, and / or others!

- Members have learned how to prepare perennial crops, fruit trees and berry bushes for the winter.
- Members have learned which crops can be planted in the fall.
- Members understand the importance of cleaning and properly storing containers, rain barrels, supportive structures and garden tools for the winter.

REFERENCE MATERIAL IN THIS SECTION:

A look at:

- Planting fall and perennial crops, preparing perennial crops for winter
- Preparing fruit trees and berry bushes for winter
- Preparing containers, rain barrels, support structures and garden tools for winter

ACTIVITIES:

1. Plant a science experiment
2. Window box herb/salad garden
3. Sharpen pruners

Sample Meeting Agenda Time: 3 hours

Note: Agendas are provided as a suggestion. There is more meeting content than what can be completed in 2 hours. Please choose activities according to skill and attention level of your members. Be creative!

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information	Fall and perennial crops	10 min
Activity	Activity #1: Plant a science experiment	30 min
Topic Information	Fruit trees Berry bushes Containers	20 min
Activity	Activity #2: Window box herb/salad garden	30 min
Topic Information	Rain barrels Supportive structures Garden tools	10 min
Activity	Activity #3: Sharpen pruners	40 min
At Home Activities/ Digging Deeper (for Senior Members)	Choose one of the activities	5 min
Wrap up, Adjournment & Social Time		10 min

FALL PLANTING AND READYING PLANTS FOR WINTER

Spending a bit of time caring for fall and perennial crops, fruit trees and berry bushes before winter arrives will ensure that these crops emerge from the dormant season healthy and ready to produce.

FALL AND PERENNIAL CROPS:

Most root crops can be left in the soil through the fall, in fact frost causes some of them to produce sugars that make them taste sweeter, but be sure to dig them out before the ground freezes completely and store them appropriately.

Fall is the best time to plant garlic bulbs. Follow the planting directions for the variety you choose, aiming to get the cloves in the ground near the average date of the first fall frost (*find the date for your area at <http://www.omafra.gov.on.ca/english/crops/facts/climzoneveg.htm>*). If the fall is mild and shoots do appear, apply a thick layer of mulch to protect them from the cold.



If you have perennial crops like asparagus, horseradish and rhubarb in the garden you can give them a fall tidy up and mulching once the asparagus ferns have turned brown. It is also helpful to mark the locations of any perennial plants so that you do not accidentally treat them like weeds in the spring!

FRUIT TREES:

It is possible to plant some fruit trees in the fall. Your local fruit tree nursery can provide more detailed information about optimal planting times for fruit tree varieties in your zone.

Do It!

Activity: Plant a science experiment.

A thorough fall clean up around fruit trees, picking up any fruit, leaves, twigs or branches on the

ground is an essential insect and disease prevention strategy. Once leaves have fallen, and before temperatures do, assess the fruit tree's structure and mark any branches that will need to be pruned in late winter or early spring. Check for branches that are rubbing against each other, branches with wounds or those that are growing at a less than ideal angle.

To protect against animal damage, apply a white plastic spiral guard to the trunk of fruit trees in the fall, pushing the guard down into the soil slightly, and pull any mulch away from the trunk.

Experience it!

Visit a commercial fruit or vegetable grower to see how crops, soil and equipment are prepared for winter.



BERRY BUSHES:

Some raspberry and blackberry varieties can be planted in the fall and many berry bushes benefit from some extra care before winter arrives.

Strawberry bushes need to be protected from the cold with straw. Apply the straw before temperatures dip below -7 degrees Celsius and remove it in the spring when there are signs of new leaf growth underneath the straw.

Both raspberry and blackberry canes require pruning after the berries have been harvested. Pruning requirements vary by variety so follow the directions on the plant label or consult the pruning tips on the Ontario Ministry of Agriculture, Food and Rural Affairs website <http://www.omafra.gov.on.ca>.

Blueberries are often grown in containers due to their need for acidic soil. To protect container

grown blueberry bushes from the cold, in mid to late-October bury the container in the ground in a spot where snow will accumulate and the plant will be protected from the wind. In mid-November mulch the soil around the blueberry bush with 10 to 20 centimetres (4 to 8 inches) of straw or cover the bush with burlap. You can prevent rabbits from munching on the blueberry bush by placing chicken wire or hardware cloth around the bush. In early to mid-Spring dig up the container and place it in full sun.

Containers that have been used to grow annual fruits and vegetables will need to be emptied, cleaned and stored for the winter, as will rain barrels. Garden tools and supportive structures will also need to be cleaned and stored.

CONTAINERS:

Compost all healthy plants and place those that were impacted by disease or insects in the garbage. You can compost the potting “soil” or sprinkle it over the lawn or other garden sites. Once the container is empty give it a scrub with a stiff brush to loosen up any soil or debris stuck to the inside of the container.

If you have an outdoor sink or tub wash the pots in a mixture of 10 parts water to one part bleach. If you do not have an outdoor washing spot, spray the pots with the 10 parts water, one part bleach mixture. They will not be quite as clean, but you will still have killed any pathogens that remained in the containers.

Plastic containers can be stored outside, but terra cotta and ceramic containers should be stored indoors, away from large swings in temperature. It is also helpful to wrap terra cotta and ceramic containers in newspaper to protect them from chips and breaks.

You may want to use one of your containers to plant a winter herb or salad garden!

Do It! Activity:
Plant a windowsill herb/
salad garden.

RAIN BARRELS:

If the rain barrel has hose attachments, remove them, drain and store until next spring. Turn the rain barrel upside down and drain it completely. If possible store the rain barrel in a garage or shed, but if it will be left outside store it upside down and secure it to prevent damage and water accumulation. If necessary reconnect your downspout and direct it away from the building’s foundation.

SUPPORTIVE STRUCTURES:

Remove structures like trellises and plant cages from the garden and give them a good spray with the hose. Complete any repairs that are required and then store either in a shed or garage or well-secured in an outdoor location.

GARDEN TOOLS:

Drain hoses, sprinklers and watering cans, check for cracks and leaks, and store out of the elements.

Remove dirt from shovels, hoes, pruners, and other garden tools. Rust can be removed with a stiff wire brush or by soaking for several hours in strong black tea, and mineral oil or WD-40 will lift sticky plant sap. Wood handled tools will benefit from an application of wood conditioner.



Sharpen pruners, hedge clippers, grass shears and loppers along with shovels, spades, hoes, and garden forks. There are many books and online resources that teach proper sharpening techniques, or they can be taken to a professional sharpener. Once tools are clean and sharp, give the metal parts a coating of oil.

Experience it!

Invite a professional sharpener to demonstrate how to care for garden tools or watch a video about sharpening garden tools.

Do It!

Activity: Learn to sharpen pruners.

AT HOME ACTIVITIES/DIGGING DEEPER!

1. Research how to care for garden tools and sharpen at least three different tools, for example pruners, spade and hoe. Demonstrate the method used to the group.
2. Interview/survey commercial growers of three different crops (i.e. fruit trees, vegetables, herbs, lavender, grapes) about their fall season activities. Compare the different approaches including the primary concerns of each grower, whether their activities are proactive or reactive, whether their approaches are specific to any particular growing philosophy (i.e. bio-dynamic, organic) and share results of the surveys with the group.
3. Research the best fruits, vegetables and herbs to grow indoors and choose at least three to plant and care for through the winter.

ACTIVITIES:

ACTIVITY #1

PLANT A SCIENCE EXPERIMENT

DO	<p>Time: 30 minutes</p> <p>Materials/Resources:</p> <ul style="list-style-type: none">– One pair of nylon stockings for each member; a wide variety of natural and synthetic items to stuff in to the stockings; scissors <p>Instructions:</p> <ol style="list-style-type: none">1. Cut the legs off of each pair of stockings, keeping the toes intact.2. Stuff one leg with natural materials (i.e. 100 per cent cotton fabric, biodegradable packaging, food waste, paper, cardboard, small pieces of wood, etc.).3. Stuff the other leg with synthetic materials (i.e. synthetic fabrics, plastics, glossy paper, glass, etc.) .4. “Plant” each stocking in the garden site, burying in a hole at least 30 centimetres (12 inches) deep and leave undisturbed through the winter until planting time in the spring. Mark the location of each stocking.5. At planting time next spring dig up the stockings and see what has decomposed and what has not.
REFLECT	<p>Learning Outcomes:</p> <p>Members will be able to see the work of the microorganisms in their garden site.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What do you think will decompose fastest? Slowest?– What else could we bury in the garden site to see the soil’s microorganisms at work?– If your garden site is a container, do you think there will be any decomposition?

ACTIVITY #2

PLANT A WINDOWSILL HERB/SALAD GARDEN

DO	<p>Time: 30 minutes</p> <p>Materials/Resources (for one windowsill herb/salad garden):</p> <ul style="list-style-type: none">– Plant container with tray, 15 to 30 centimetres (6 to 12 inches) deep; trowel; potting “soil”; watering can; seedlings (i.e. herbs: chives, mint, oregano, parsley, rosemary and sage; salad greens: arugula, beet, loose leaf lettuce, mustard, and spinach) <p>Instructions:</p> <ol style="list-style-type: none">1. Place 5 to 8 centimetres (2 to 3 inches) of potting “soil” in the bottom of the pot. (Several plants can be planted together in a rectangular windowsill pot or place them in individual pots at least 15 centimetres (6 inches) wide.)2. Carefully remove seedling from its original pot and gently fluff its roots. Place the seedling in its new container with the roots flared out.3. Once all the seedlings are in the new pot finish filling it with potting “soil”, firming gently around the plants. Leave about 2.5 centimetres (1 inch) between the top of the container and the soil level.4. Water the seedlings and place in a sunny window. Once you start seeing new growth you can start snipping leaves off the plants to use.5. Water the plants when the soil feels dry up to the second knuckle of your finger. Water thoroughly, until it starts to drain out the bottom into the tray below the container.
REFLECT	<p>Learning Outcomes:</p> <p>Members will have a windowsill food garden to enjoy throughout the winter months.</p>
APPLY	<p>Processing Prompts:</p> <ul style="list-style-type: none">– What are some important things to remember about container gardens?– What other plants could we plant in a windowsill garden? What plants would not grow well in a windowsill garden?

ACTIVITY #3

LEARN TO SHARPEN PRUNERS

http://articles.chicagotribune.com/2011-10-21/news/ct-sun-garden-1024-tool-care-20111020_1_scissorlike-action-felco-anvil-pruners

DO

Time: 40 minutes

Materials/Resources:

- One or several pairs of clean, dry pruners; one or several small, fine whetstones or small diamond files; gloves; safety glasses; mineral oil or WD-40

Instructions:

1. On bypass pruners (they have curved blades), you sharpen the top blade, which is usually thinner. One surface of that blade is flat. On the other, you will find a bevel, a narrow band that meets the cutting edge at an angle of about 23 degrees. Your goal is to preserve that same bevel angle while you get the edge sharp.
2. Wearing gloves, hold the pruners down on a table, pointed away from you, with the bevel up.
3. Starting at the base of the blade, near the hinge, lay the stone or diamond file against bevel, following its angle. Using moderate pressure, stroke the stone/file toward the edge while also moving it along the edge toward the tip. It should take 10 to 20 strokes, always in the same direction, before the whole edge is sharp.
4. Test the pruners' sharpness by cutting a branch. When you are satisfied, turn the tool over. You'll be able to feel a burr of small metal shavings along the back side of the sharpened edge. Holding the stone/file flat against the blade, remove the burr with one stroke.
5. This same technique can be used for other cutting tools; the key is always to follow the bevel angle. On anvil pruners (they have one straight, sharp blade that strikes a flat plate), sharpen the cutting edge of only the thin blade, but from both sides. On hedge clippers and grass shears, sharpen the beveled cutting edges on both blades. Loppers are simply long-handled pruners.
6. Oil the mechanism and wipe all the metal parts with oil to protect them against rust.

REFLECT	Learning Outcomes: Members will learn how to sharpen garden tools.
APPLY	Processing Prompts: <ul style="list-style-type: none">- What did you find most difficult about sharpening the pruners?- What other garden tools would benefit from being sharpened?- What are the advantages of knowing how to sharpen garden tools?