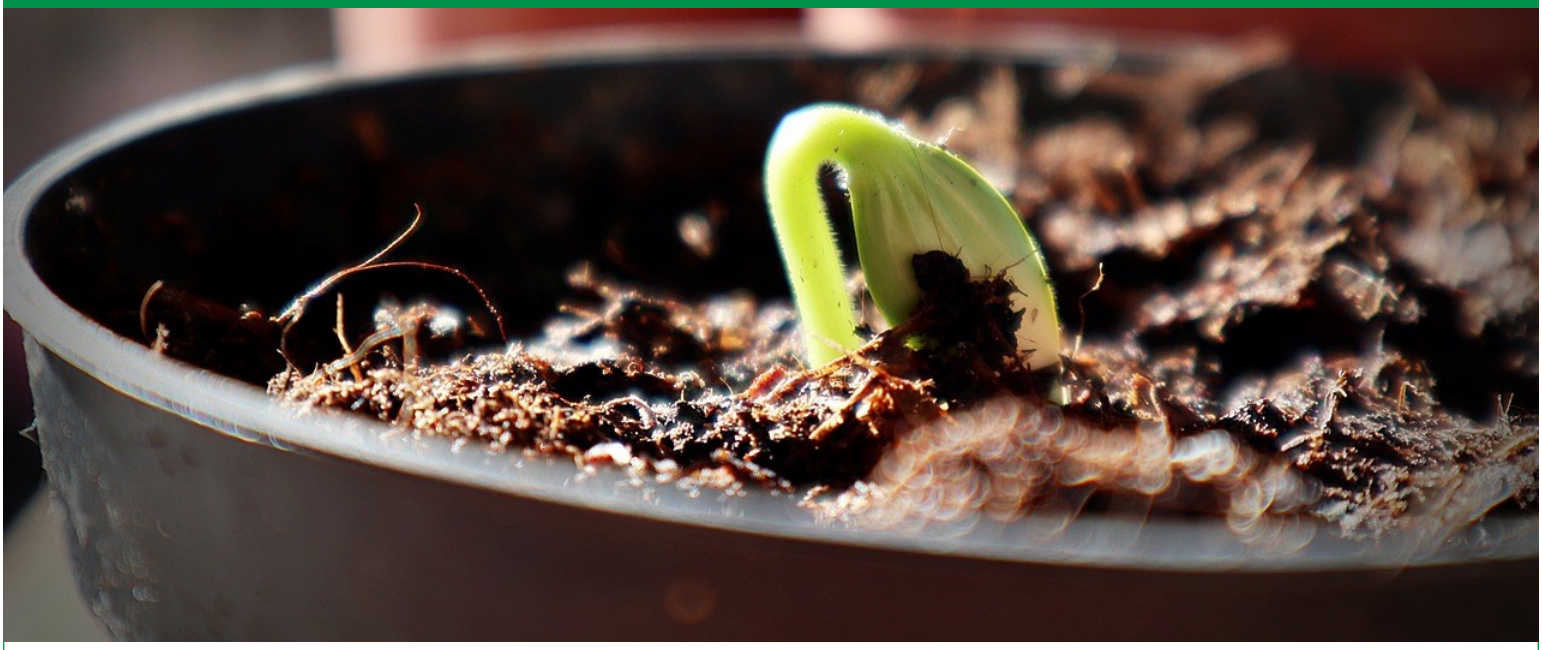


Gardening in the Biosphere:

Seed to Soil

GEORGIAN BAY BIOSPHERE
MNIDOO GAMII

Gardening in the Biosphere

This guide is designed for gardening in the Georgian Bay Mnidoo Gamii Biosphere region, that spans from the Severn River north to the French River, along the eastern shore of Georgian Bay, Ontario.

CONTENTS

GLOSSARY

Amendments: Soil additives to enhance soil features.

Annuals: Varieties that complete their life cycle in one year or less, requiring sowing every year.

Companion Planting: Planting different plants together that benefit one another.

Compost: Organic matter often made from decomposed/broken down plant material. Compost can be used to replenish soil nutrients and introduce soil biology to a growing area or to reduce landfill waste.

Crop Rotation: The practice of growing different types of crops in the same area in sequenced seasons.

Crop: A plant that is cultivated for harvest, like cutting flowers or vegetables.

Deadheading: Cutting dead flowers off a plant, encouraging the plant to bloom again.

Direct Sow: Sow seeds directly in their permanent growing space.

Fruit: A seed capsule that emerges from a flower, such as a tomato.

Germination: The moment when a seed begins to grow.

Hardiness Zone: A geographic area defined to encompass a certain range of climatic conditions relevant to plant growth and survival.

Hardening Off: The 7 to 10-day process of acclimating plants started indoors to outdoor conditions.

Herbs: Plants with leaves, seeds, or flowers used for flavoring.

Organic: Relating to or derived from living matter. A product created without the use of artificial chemicals.

Perennials: Varieties of flowers, herbs, fruits, or vegetables that live for two or more years.

Potting Soil: A mixture of loam, peat, sand, and nutrients, used to grow plants in containers.

Prune: Trim a plant by cutting away dead or overgrown branches or stems to increase fruitfulness.

Raised Bed: Any plant structure that sits on top of existing soil.

Soil Amendment: Any material added to a soil to improve its physical properties (e.g. water retention, nutrient availability).

Succession Planting : Sowing at least once more after the initial sowing, which extends and increases the harvest. Three ways to successive sow: 1. Staggering sowings of the same crop; 2. Sowing two varieties of the same crop with different maturing dates; 3. Replacing one finished crop with a different crop.

Thinning: The act of physically reducing extra seedlings so that remaining plants are spaced properly.

Transplanting: Moving a plant to a different growing space.

Variety: A species that has naturally formed a unique characteristic. For example, from cabbage came kale and kohlrabi which both adapted unique, characteristics that differ from cabbage.

Vegetable: An edible plant or part of a plant that does not contain seeds.

Source: www.botanicalinterests.com

Gardener's Tip

New gardens, no matter what type, are not like new electronics or cars where you can expect things to run smoothly simply because they are new. With proper care, your garden will get better with age. Don't compare the results of your first year to your grandmother's well-established garden. The important thing is just to start!

You're not in this alone. There are trillions of microorganisms, worms, and other insects helping to make your garden flourish over time. They need a garden bed though!

BUILDING NEW GARDENS

Location

Many of your fruits and veggies would like to see 6-8 hours of sunlight daily. Observe your yard or other potential garden site to see which areas receive the most sunlight. Remember, it is easier to shade a sunny spot than it is to sun a shady spot!

Be sure to keep your distance from trees too. Not only will they grow and eventually shade your garden, but their roots will compete for nutrients in the soil.

Common garden crops will like a lot of water but need drainage to prevent root rot. Therefore, be sure to avoid low areas and wet spots where the soil stays soggy. This is also the time to consider how you will water your garden. For example, is the garden close enough to a building to set up a rain barrel? Is the potential garden site on the opposite side of the building's hose connection? Planning how your garden will source water is as important as knowing the amount of sun it will receive.

Ideally, the garden site will also be as level as possible, this can be achieved through raking and building the soil over time. Gardeners will often tell you it helps to have the garden close to your house where you can see it from at least one window. You don't want it to be out-of-sight, out-of-mind!

Raised Bed vs. In-Ground

Conventional gardening involves garden beds directly in the ground. Depending on your location and soil type, this can be an advantageous option.

Raised bed gardening is a popular option which involves a frame (usually wooden) filled with soil to grow crops. Both have advantages and disadvantages that require consideration given your garden location.

You can use the information in the *Raised Bed vs. In-Ground Advantages and Disadvantages* table on page 5 to help inform your decision on garden type.

Building Your Garden

If you've decided a raised bed garden is right for you, you'll need to research the best model and materials that fit your budget and garden space.

Many gardeners choose to have multiple raised beds, or both raised beds and in-ground gardens for different purposes. There are many combinations of materials, sizes, shapes, and models available online and many hardware stores also sell kits that include everything you need.

The basic principles of garden creation are the same for both raised bed and in-ground gardens. Outline the size and shape of the bed and then prep the soil. In the fall or early spring, you can lay

Raised Bed vs. In-Ground Advantages and Disadvantages

	ADVANTAGE	DISADVANTAGE
RAISED BED	• Easier to keep out weeds • Contains quality soil (brought in) • More efficient draining • Can be easier on backs and knees due to less bending and stooping • The soil warms up sooner so there is a potential to plant earlier • Better ability to keep out ground-dwelling pests	• Require careful planning to ensure enough space for all plant types you want to grow • Can be more expensive upfront • Better drainage requires watering more often • Depending on the materials used, maintenance will be required
IN-GROUND	• More options for shape and size • Can have lower upfront cost • Can grow larger variety and quantity of crops • Usually less frequent watering • No need to purchase and move large volumes of soil • Doesn't require much preparation once your spot has been located and tilled.	• Greater challenge of weeds and pests • More physical and labour-intensive • Takes up more space • More complex and costly fencing required for pest management

down tarps or some equivalent to kill existing weeds and seeds. If you don't have the time or materials for this option, you can turn over the top layer of soil, so any grass is upside-down and the soils faces upward. It is not necessary to dig deeper into the soil and in fact can harm the microorganisms which are already established there.

Layer newspaper, organic material such as fallen leaves, and then compost or manure onto your garden bed. If you're creating a raised bed, you may want thicker layers or additional soil on top to fill the beds. For in-ground gardens, be sure to poke through the newspaper when you plant. You might create a border around the garden to clearly mark it and create a weed barrier (use logs, rocks, wood planks, etc.).

Check Your Soil

For any new garden, it is a good idea to purchase an at-home soil test kit from a hardware store or green house. This will give you some idea of the existing nutrients, or possible deficiencies, already in the soil.

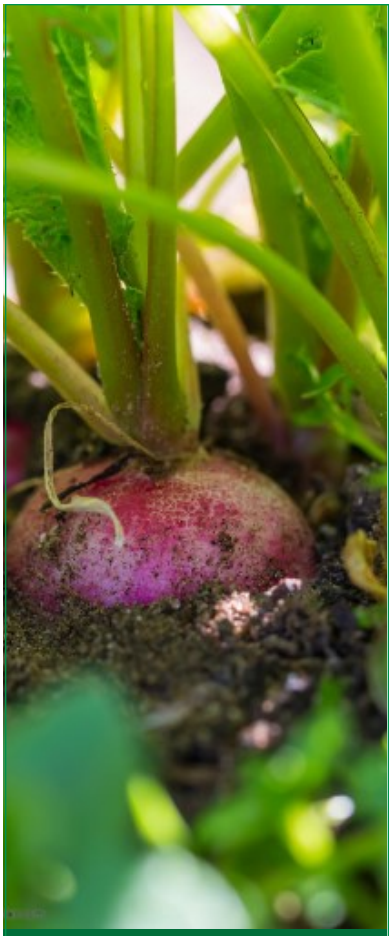
Most plants like a mix of large sand particles (40%), medium sized silt (40%), and small clay (20%). Conduct an at-home test to gain a rough idea of the amount of each in the soil. Mix a handful of garden soil with water in a mason jar, shake, then let settle. The heavier sand settles to the bottom while the light clay rests on top. By looking at how thick the layers are in comparison to each other, you can judge what kind of sand, silt, clay mix your garden holds.

Kids Can Grow

Will you be building this garden with children, grandchildren, or students? Involve them in every step! Kids that grow kale and spinach go on to eat kale and spinach.

Download Kids Can Grow for a kid-friendly version of this information from gbbr.ca/gardens.

Also find the printable 'Green Thumb Certificate' for young, aspiring gardeners, and more links and resources for expanding children's participation in, and knowledge of, gardening.



Fruit & Veggie Families

Brassicaceae: Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Kale, Kohlrabi, Radish, Rutabaga, Turnip

Cucurbitaceae: Cucumber, Gourds, Muskmelon, Pumpkin, Squash, Watermelon

Apiaceae: Carrot, Celery, Fennel, Parsley, Parsnip

Solanaceae: Eggplant, Pepper, Potato, Tomato

Chenopodiaceae: Beets, Swiss Chard, Spinach

Fabaceae: Beans, Lentils, Peas

Asteraceae: Artichoke, Endive, Lettuce

Alliaceae: Garlic, Leek, Onion

STEP 1. PLANNING FOR PLANTS

Taking Note

A productive and happy garden requires some thought at the beginning to determine what you're going to plant and where. Ask yourself: How much space do I have to plant? What fruits and veggies do I want to grow? Do I want a wide variety of plants? Or should I focus on only a few different herbs and veggies?

No matter the size or scale of your garden, you will want to start your season with a pencil and paper, or ideally a journal in which to document your garden through the season over the years. Sketch a rough map of your garden beds and pencil in which plants will go where based on your answers to the questions above and the topics below: crop rotation and companion planting. This will also help you determine how many seeds to start of each veggie and/or how many seedlings to purchase.

Crop Rotation

If you're seeding or planting an existing garden bed, do you know what was planted there last year?

It is a good idea to practice crop rotation, the simple idea of not planting the same annual fruit or vegetable in the same garden spot in consecutive years. Moving your crops around discourages a build up of pests or diseases which can overwinter in the soil. As some fruits and veggies are heavy nutrient feeders or require a lot of a particular nutrient (e.g. nitrogen, phosphorous), crop rotation can help your soil from becoming overly depleted by giving it a chance to replenish nutrients. No garden is too small for crop rotation.

Visual example of crop rotation. *foodbloggersofcanada.ca*

There are different interpretations of how and which varieties to rotate. A general rule of thumb is: leaf, root, fruit, legume (peas, beans), repeat.

When considering crop rotation, remember that the pests, diseases, and nutrient needs are characterized by plant family. It is recommended to choose plants from different families to rotate into new places. *See Fruit & Veggie Families* list in the left sidebar.

STEP 1. PLANNING FOR PLANTS, CONTINUED

Companion Planting

Companion planting is a technique that has been used for centuries to improve garden productivity. Originally based on observation and now proven in science, it is the practice of planting certain crops together based on a beneficial or symbiotic relationship. Similarly, it involves the distancing of crops with poor relationships. The numerous benefits include improved pest and disease control, attracting beneficial insects, improvements to the soil (e.g. fixing nitrogen), creating microclimates for better growing, and even improving crop flavour and yield.

Plants with beneficial relationships should be planted within two or three rows of each other. Similarly, plants that have unbeneficial relationships should be planted no closer than 2-3 rows apart. There are many neutral plants that can be used to fill space between these rows.

There are dozens of companion planting guides available online. A very extensive list can even be found on Wikipedia, it includes which specific pests are deterred by companions. The table below provides the basics of companion planting for common crops in our region.

Companion Planting Guide

CROP	FRIENDS	FOES
Bush beans	beets, corn, cucumber, peas, nasturtium, radish, strawberry, summer savory	allium family, fennel
Beets	allium family, beans (bush), lettuce, brassica family, tomato	pole beans
Carrots	beans, chives, lettuce, onion, parsley, peas, pepper, radish, rosemary, sage, tomato	celery, dill
Cucumber	beans, broccoli, cabbage, chives, corn, dill, eggplant, kale, lettuce, marigold, nasturtium, onion, oregano, peas, radish, tomato	basil, marjoram, potato, rosemary, sage, summer savory
Lettuce	beets, carrot, cauliflower, cucumber, dill (use sparingly), kale, radish, strawberry	allium family, broccoli, cabbage
Peas	beans, brassica family, carrot, cilantro, corn, cucumber, mint, radish, spinach	allium family
Squash	beans, borage, catnip, corn, marigold, melon, mint, nasturtium, onion, radish	potato, pumpkin
Tomato	basil, beets, carrot, chives, cilantro, cucumber, garlic, marigold, melon, mint, nasturtium, parsley, pepper, onion, radish, sage	brassica family, corn, dill, fennel, potato

Companion Planting Example

A classic example of companion planting is the Three Sisters historically planted by First Nations and still planted by many people today– corn, pole or vine beans, and squash. The tall corn would provide a structure for the beans to climb. As the beans are in the legume family, they provide nitrogen in the soil for both other plants. The squash spread on the ground creating shade which eliminated weeds and thus competition for soil nutrients. The shaded ground would also have retained water better.

Seed Germination Minimum Temps*

Minimum 2°C: Parsnip, Spinach, Lettuce, Onion

Minimum 5°C: Celery, Parsley, Peas, Cabbage, Carrot, Cauliflower, Beets, Radish, Swiss Chard, Turnip, Broccoli

Minimum 10°C: Asparagus, Tomato, Corn

Minimum 15°C: Beans, Eggplant, Peppers, Cucumbers, Squash, Pumpkin, Melons

Minimum 21°C: Brussel Sprouts

*Approximate. Minimum temperatures are not optimal for maximum germination rates.

STEP 1. PLANNING FOR PLANTS

Temperature

After you've sketched out your garden for this season considering crop rotation, companion planting, and what you'd like to grow, the next step is planning when to start seeds and transplant your seedlings.

The main factor which determines the seeding and planting schedule is temperature. Planting seeds and transplanting seedlings outdoors too soon can lead to frost kill. Furthermore, different fruit and vegetable seeds germinate and grow in different temperatures. New gardeners might want to start by purchasing seedlings which were started in optimal conditions. For those wishing to start plants from seed, carefully read and adhere to the directions on each package.

You'll notice on many seed packages it may provide instructions to direct sow the seed 'as soon as the soil can be worked' (e.g. carrots, greens, onions). Test your soil's 'workability' after it has thawed completely by seeing if you can roll it into a ball in your hands. If it crumbles, it has dried enough to be workable. If it holds its form, it is still too wet.

For the majority of your crops, it can be straightforward to determine your seeding and transplanting dates based on average frost free days. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) has a very useful outline of Ontario's growing zones (also called *hardiness* or climate zones) and the average first and last frost dates for each zone. See it here: www.omafra.gov.on.ca/english/crops/facts/climzoneveg.htm. Along eastern Georgian Bay, the zone is slightly moderated by the lake compared to inland, so the average last frost dates vary between May 11th - 17th. Find your property on the map to be sure.

The *Eastern Georgian Bay Planting Chart* lists the *approximate* dates for our region. You can use this as a rough guide to help schedule your planting. Note that these dates can vary significantly year by year, greater future variation can be expected with the effects of climate change.

A helpful exercise in determining seed starting and planting dates is to follow the instructions to complete Mother Earth Living's handy Spring Garden Worksheet, available from www.gbbr.ca/gardens. This will help you put the right plants into the ground at the right time based on the average frost free days.

It is strongly recommended to keep track of the dates your seeds germinate and when you transplant them outside in a journal or notebook. This information can be very interesting and sometimes helpful to compare in future growing seasons.

Note: All of the plants listed, except slow-growers such as eggplants and peppers, could be direct-sown in the garden. By starting them indoors, however, you can gain an earlier and sometimes better harvest. Some plants are especially sensitive to transplanting (e.g. cucumbers, root vegetables, lettuce and greens)) and you may prefer to start outdoors to avoid seedling loss.

Eastern Georgian Bay Planting Chart

CROP	WEEKS INDOORS BEFORE TRANSPLANTING	TRANSPLANT DATE, RELATIVE TO LAST FROST	SOW INDOORS FROM-TO	EARLIEST OUTSIDE TRANSPLANT OR SOW
Fruits & Vegetables				
Arugula	Direct sow only	4 weeks before	-	22-Apr
Beans (bush & pole)	Direct sow only	At frost date	-	20-May
Beets	5 to 6	2 weeks before	25-Mar to 1-Apr	6-May
Broccoli	4 to 6	2 weeks before	25-Mar to 8-Apr	6-May
Cabbage	4 to 6	2 to 4 weeks before	11-Mar to 8-Apr	22-Apr to 6-May
Carrot	Direct sow only	2 to 3 weeks before	-	29-Apr to 6-May
Cauliflower	4 to 6	2 weeks before	25-Mar to 8-Apr	6-May
Chard	4	2 weeks before	8-Apr	6-May
Celery, celeriac	10 to 12	1 week after	4-Mar to 18-Mar	27-May
Corn	2 to 4	0 to 2 weeks after	22-Apr to 20-May	20-May to 3-Jun
Cucumber	3 to 4	1 to 2 weeks after	29-Apr to 13-May	27-May to 3-Jun
Eggplant	6 to 8	2 weeks after	8-Apr to 22-Apr	3-Jun
Kale, collards	4 to 6	2 to 4 weeks before	11-Mar to 8-Apr	22-Apr to 6-May
Kohlrabi	4 to 6	2 to 4 weeks before	11-Mar to 8-Apr	22-Apr to 6-May
Leeks	8 to 10	2 weeks before	25-Feb to 11-Mar	6-May
Lettuce	4	2 to 4 weeks before	25-Mar to 8-Apr	22-Apr to 6-May
Melons	3 to 4	1 to 2 weeks after	29-Apr to 13-May	27-May to 3-Jun
Mustard	4	2 to 4 weeks before	25-Mar to 8-Apr	22-Apr to 6-May
Onions	8 to 10	3 to 4 weeks before	11-Feb to 4-Mar	22-Apr to 29-Apr
Pak choi	4	2 weeks before	8-Apr	6-May
Parsnip	Direct sow only	3 to 4 weeks before	-	22-Apr to 29-Apr
Peas	Direct sow only	6 weeks before	-	8-Apr
Peppers	6 to 8	1 to 2 weeks after	1-Apr to 22-Apr	27-May to 3-Jun
Radish	Direct sow only	3 to 4 weeks before	-	22-Apr to 29-Apr
Spinach	Direct sow only	4 to 6 weeks before	-	8-Apr to 22-Apr
Squash (summer)	3 to 4	1 to 2 weeks after	29-Apr to 13-May	27-May to 3-Jun
Squash (winter)	3 to 4	1 to 2 weeks after	29-Apr to 13-May	27-May to 3-Jun
Tomatoes	6 to 8	1 to 2 weeks after	1-Apr to 22-Apr	27-May to 3-Jun
Turnip	Direct sow only	2 to 3 weeks before	-	29-Apr to 6-May
Herbs				
Basil	4 to 6	1 week after	15-Apr to 29-Apr	27-May
Cilantro	Direct sow only	0 to 3 weeks before	-	29-Apr to 20-May
Dill	Direct sow only	0 to 3 weeks before	-	29-Apr to 20-May
Parsley	8 to 10	2 weeks before	25-Feb to 11-Mar	6-May

Source: The Farmer's Almanac

Ontario Organic Seed Suppliers

Golden Acres Farm
goldenacresfarm@hotmail.com
519-656-3152
Gads Hill

Greta's Organic Gardens
www.seeds-organic.com
greta@seeds-organic.com
613-521-8648
Ottawa

Hawthorn Farm
www.hawthornfarm.ca
sales@hawthornfarm.ca
519-343-3375
Palmerston

Ontario Seed Company
www.oscseeds.com
seeds@oscseeds.com
519-886-0557
Waterloo

STEP 2. SEEDS & PLANTING

Seeds & Seedlings

Seeing the first green speck of your new plant emerging from a seed is an amazing experience! Sometimes you only have to wait a day or two, sometimes seeds take three weeks to germinate. Here are our top tips to getting your seeds started.

1. **What to start indoors & when?** The information in Step 1. Planning for Plants will help you determine the answer to this question. This is a crucial consideration for your garden as some seeds need more of a head start than others. Starting seeds indoors will help you eat delicious produce earlier.
2. **Quality Seeds**: In order to grow healthy plants, you need to start with good seeds. It is worth your while to invest in seeds from reputable companies. They will be fresher and have better germination rates. Of course, you can always save seeds from non-hybrid plants to have your own supply of quality seeds.
3. **Soil**: Use potting soil that is a sterile, soil-less mix to start your seeds. It is light and prevents issues with fungal growth. Add water to the bag of soil before putting into containers or dump soil into a bin and mix water into then.
4. **Containers**: The most important thing for containers is drainage. You don't want water sitting in the base of a pot as it can rot your seedlings. You can use seeding trays or get creative and check your recycling bin for egg cartons, paper towel rolls or milk cartons. Make sure they are clean & disinfected (use a diluted solution of 9 parts water to 1 part bleach). Avoid products with peat moss.
5. **Seeding**! Read your seed packages first for planting depth. A general rule of thumb is that small seeds are planted at a shallow depth and larger seeds are planted deeper. Fill the containers to the top with moistened soil and gently press on the soil without packing it too tight. Use your finger or a pencil eraser to make the right depth of hole for your seeds. Mist the seeds with water and cover lightly with soil. They're planted!
6. **Label Your Plants**: as soon as you plant more than one type of seed it is easy to mix them up! Write the variety and date on tape for the container, or on a popsicle stick to put in the soil.
7. **Temperature**: Start your seeds in a warm place such as on top of a fridge or near a woodstove.
8. **Light**: As soon as your seedlings appear, place them in the brightest, warmest window you have. If the plants have to stretch for light, they will get long & leggy which could cause problems in their later development. Rotate them in the window daily so they face the light from different angles. Ideally your seedlings will need 10-14 hours of light. You can invest in specialized warming mats and grow lights to create these conditions if you don't have a warm space or sunny window.
9. **Water**: Too much water is as bad for seedlings as too little water. A

STEP 2. SEEDS & PLANTING, CONTINUED

light plastic covering to increase humidity in warm places will help retain moisture until they germinate. Frequency of watering will depend on the conditions of your house, so you will need to check often. Allow the soil to partially dry out between watering. Use a spray bottle of room temperature water to mist the soil surface, and water more thoroughly as the plants grow.

10. **Food**: As the seedlings grow and reach their 2nd or 3rd set of leaves, start giving them a natural, water soluble fertilizer mixed at ½ strength. Look for one high in phosphorous on the label. Do not over do the fertilizer! You will mix in compost when you transplant.
11. **Airflow**: Putting a fan on low near your seedlings is a good idea. It will help air flow to prevent dampening-off disease or mold from forming. It will also make your plants stronger and more resistant to wind once they are living outside.
12. **Thinning**: It is a good idea to start more than one seed in a pot as not every seed will germinate. When multiple seedlings grow too close together, either in a pot or in your garden bed, you will need to thin some of them to have proper spacing (check the seed packages for recommended spacing). It is this space that allows a plant to flourish without competition. Simply snip your excess seedlings right at the soil line taking care not to damage the roots of the seedling you're keeping. Consider adding the thinned seedlings to salads.

Potting Up

If your plants start to outgrow their pots before it is warm enough to go outside, you can transplant them into larger pots. This is an important practice for some crops, such as tomatoes.

Choose a good quality transplant mix or make your own from compost, coconut coir, perlite, and potting soil. Fill the new container half-way with moist soil mix. Water the seedlings first so the soil better sticks to the roots. Carefully remove seedlings from original containers by placing your hand over the top with the seedling between your fingers, then turn upside -down. Place the seedings in the new pots and top up with soil no further than the first set of leaves.

Continued Learning

There are countless resources online to help you learn about this process and tricks for individual plants. When you order seeds from reputable sources, they will have helpful information on the seed packages and online. You can also check out The Old Farmer's Almanac Growing Guides at www.almanac.com/gardening/growing-guides. Each guide identifies sun exposure, soil type and pH, pests and problems, harvesting tips, recommended varieties, common questions, and more.

Tomatoes being transplanted.

Ontario Organic Seed Suppliers Cont.

Terra Edibles
www.terraedibles.ca
karyn@terraedibles.ca
613-961-0654
Foxboro

Urban Harvest
www.uharvest.ca
grow@uharvest.ca
416-504-1653
Toronto

William Dam Seeds
www.damseeds.com
info@damseeds.com
905-628-6641
Dundas

Nutrient Summary

When buying any soil amendment product you will see a number code, like 6-3-4. This code shows the ratio of major nutrients: nitrogen, phosphorus, and potassium, or NPK. It is always in that order. If you know what nutrients need enhancing, or what your plants prefer, NPK code guides product selection.

Nitrogen (N) makes for rapid vegetative growth.

Too much: Fewer flowers, poor root growth, excessive foliage without fruit development.

Not enough: smaller stem and leaf, yellowing leaves, general failure to thrive.

STEP 3. INTO THE GROUND

Feed Your Soil

In order to feed your plants, you will first need to feed your soil. As plants grow they use the nutrients in the soil. These must be replaced by healthy microorganisms and a little extra help from the gardener: you!

For new gardens, especially in-ground gardens, consider doing an at-home soil test. Kits are available at most hardware stores and garden centres. See Check Your Soil on page 5.

The broad suite of different soil additives are generally called *soil amendments.* The most common and practical amendments include:

Manure: Livestock manure holds most nutrients needed for plant growth and can increase beneficial soil organisms. Manure can be purchased directly from a farm or any garden centre. (Any livestock animal manure will work, not dogs or cats). Aged and fresh manure hold different benefits, avoid applying within 3 months of harvest to avoid pathogens.

Compost: Homemade compost made from decomposed kitchen scraps and yard clippings is an inexpensive way to greatly improve your soil. Add 3-4 inches (7-9 cm) of compost to garden soil each spring and work it into the top few inches. See pages 16-17.

Aged leaf mulch: A very beneficial additive to sprinkle as mulch in hot weather. It cools the soil and breaks down attracting soil organisms. Alternatively, add to the soil in the fall, then mix it into the soil in spring. Shred leaves with a lawnmower, pile, and allow to age for 2-3 years. Turn your pile monthly for faster results.

To add to your garden, sprinkle 1-3 inches (2.5-7 cm) of the compost, manure, or leaves on top of the soil in the fall or one month before planting. This timing will stop it from burning plants with too many nutrients. Avoid adding any amendments prior to storms or stretches of rainy weather.

Some gardeners work compost and leaf mulch into the soil by turning it over into the top 2-6 inches (5-15 cm). This can help to correct drainage issues from excessive sand or clay.

When adding amendments when plants are established, add it around the perimeter of the plants. This is called a side dressing and can be done every 2-3 weeks. Don't turn this into the soil as you can damage the roots.

Another summer option is 'compost tea'. Fill a bucket 1/3 full with compost or grass clippings and top up with water. Steep for 3-4 days, strain, and use the water immediately in the garden or for potted plants.

Once you are comfortable with these basic soil amendments, begin to research other options to supplement your practice if needed: seaweed, worm castings, wood ash, bat guano, bone and blood meal, biofertilizers, and many more. Only try one at a time to avoid overwhelming your plants and to more accurately assess results.

Always choose organic products. Synthetic fertilizers don't improve soil quality in the long term. If you've purchased a soil amendment product, follow the directions on the package around application and timing.

STEP 3. INTO THE GROUND, CONTINUED

Hardening Off

When the weather starts to stay warm and the nights are warm also, start getting your garden and the plants ready. You will need to "harden off" your seedlings before you can plant them directly in the ground. This is especially important if you started them from seed but it is a best practice even for store bought plants.

To harden off the seedlings, expose them gradually to the elements outside starting at least two weeks prior to transplanting them. Beginning on a warm but cloudy day, leave them in dappled or full shade somewhere they are sheltered from the wind. Leave them out only for a few hours at a time and be sure to bring them indoors at night. Gradually increase their exposure to sun and wind, and the length of time they are outside. You want them to slowly get used to outdoor living conditions. Keep the soil moist, outdoor elements will dry out the seedling's pots more quickly.

Transplanting Seedlings

Ensure the ground is warm enough for transplanting to avoid shocking the seedlings. An old gardener's test is to sit in the soil yourself and judge if the temperature is comfortable!

The soil in your garden may have been compacted by heavy snow during the winter. Use a hoe or spade to gently loosen and aerate the soil ahead of your planting date. This is also a good time to add compost and/or manure, especially if amendments were not added in the fall.

The best day to transplant will be a warm day with cloud cover but no rain. Plant early in the morning during these conditions to provide your plants the maximum amount of undisturbed time to settle into the soil.

Consult your garden plan to confirm where the plants will go. Dig a hole about twice as big as the container your plant is in. Carefully take your plant out of its container. Hint: water the plant first and turn the pot up-side down with your fingers on either side of the plant stem to catch the plant.

Put the roots into the hole and cover them with soil up to the lowest leaves on the plant. Press the soil down gently around the plant with your hands and then water it completely to soak the roots. Don't scrunch the roots! Gently soak the soil around the transplants immediately to help settle the roots.

Your plants may benefit from added phosphorous early on in development. You can add two tablespoons of a 15-30-15 starter fertilizer into a gallon of water and give each seedling a cup of the solution a few days after transplanting.

Keep an eye on the forecast! Have a plan ready in case of late spring frosts. Light sheets or plastic that is not too heavy can be used to protect plants. Be sure to remove protective coverings in the morning.

Phosphorus (P) promotes root growth, promotes flowering & fruit set, and disease resistance.

Too much: Extensive roots, fewer shoots, stunted growth.

Not enough: poor root growth, few flowers, no fruits.

Potassium (K) promotes overall vigor, fruit ripening, and disease resistance.

Too much: low disease resistance, leaf scorching.

Not enough: slow maturity of fruits, scorched leaves, poor root and shoot development, heightened reaction to frost, drought, and pests.

Edible Weeds

Did you know that many of the plants we pull from our gardens are not only edible, but in fact packed with nutrients?

Check to see if you're pulling out any of these tasty treasures. Give them a wash and add the leaves to your next salad:

1. Dandelions
2. Purslane
3. Clover
4. Lambs quarters
5. Plantain
6. Chickweed

Double check each plant to make sure you've identified it correctly.

STEP 4. MAINTENANCE & CARE

Weed Control

The majority of time you spend in your garden will likely be for weed control. While it can seem daunting and time consuming at first, with practice weeding can actually become like any other enjoyable time outside.

Having a positive attitude about weeding is important because it is crucial to do regularly. If left alone, weeds can quickly overtake a garden and outcompete your veggies.

Prevent weeds in the first place by using 2 inches (5 cm) of mulch directly on the soil or on top of a newspaper or cardboard layer. You can purchase mulch or use wood chips, leaves, or a thin layer of grass clippings. Many gardeners mulch garden paths and even mulch in between rows. Mulch also keeps the soil cooler and helps it retain moisture. A classic rule of gardening: bare soil is bad soil.

Even with mulching, you will still need some time each week to pull unwanted plants. Equip yourself with gloves, a trowel or weeding claw tool, a sitting pad or knee pads, and pail to collect the weeds.

You can compost the weeds you pull up but it will need to be done properly to ensure conditions will destroy seeds. See pages 14-15 on composting.

Ensure you pull up the weed roots. Only removing the leaves or flower head will often not actually destroy the plant. And be sure to remove weeds while they're flowering to prevent them from going to seed.

Pruning & Deadheading

Pruning involves removing parts of your plants with clean pruning shears or pinching off with your thumb and index finger. There are several reasons to prune: to remove dead or injured parts, disease and pest control, or enhancing a plant's productivity.

Your pruning practices will vary based on plant type, timing, and cause. Common plants to prune include tomatoes, cucumber, squash, and peppers. Consult the Farmer's Almanac, a local library, or a garden centre for specific information on your fruit and veggie varieties.

All dead and yellowing plant parts or entire dead plants should be removed. They can harbour diseases and pests which can spread to healthy plants. If the plant in question died from a disease or pest, do not add it to your compost pile.

Deadheading is the practice of removing dead flowers from non-veggie plants such as marigolds. Removing flowers from your herbs may also be a good idea as they often become bitter after flowering and going to seed.

In addition, be sure to harvest your fruiting plants frequently (such as cucumbers, tomatoes, beans). When fruit becomes over ripe it slows the production of more fruit. While we often want to admire beautiful tomatoes on the vine, we'll have more to gain from harvesting them.

STEP 4. MAINTENANCE & CARE, CONTINUED

Watering

How often you water your garden will depend on a variety of factors: weather, plant's needs, and drainage. A general rule is to ensure your garden receives 2 inches (5 cm) of water per week. Containers may need more, especially in hot conditions.

Regardless of frequency, when watering any garden it is important to be thorough so the water soaks in deeply. A soaker hose is the best option. Shallow watering leads to poor root growth.

The best time to water is in the morning when it is cool out and the water doesn't quickly evaporate. If mornings aren't an option, water in the evenings in the same conditions.

Succession Planting: From mid July to mid August, as you harvest some crops, there will be space for secondary plantings, called *succession planting*. Choose second crops with fewer days to ripening: peas, radishes, beans, carrots, lettuce, and broccoli. Follow the spring planting instructions and speed up germination by soaking the seeds overnight before planting.

Winterizing the Beds

Depending on your fruit and veggie varieties and the season, harvesting will begin in late July and continue until the end of September. Late September (if cool) is the time to plant next year's garlic. Choose a bed or section that didn't grow anything in the allium family this year. Work compost into the soil and plant the garlic cloves "*pointy side up*" 6 inches (15 cm) apart and 4 inches (10 cm) deep. Add a layer of mulch.

By October, your garden is ready to winterize. You'll want to ensure that all dead plants and any remaining fruit or veggies are removed. Certain pests and diseases can overwinter in the foliage and many composts are not hot enough to adequately kill pathogens. Any foliage that is moldy or diseased can be burned, thrown in the garbage, or composted separately.

Fall brings gardeners free mulch and future compost in the form of fallen leaves. Instead of bagging them, gather them to create mulch layers, add them to your compost, and create leaf mulch (see page 12 for details).

Move away any pre-existing leaf or other mulch in the garden, pull any remaining weeds, and add a 1-2 inch (2.5-5 cm) layer of finished compost. Put back the old mulch on top of the compost. Add a thin layer of leaf mulch to the garden beds and, after the ground is frozen, add another layer of leaf mulch especially around perennials.

Fall is also a great time to build new gardens or expansions. Many garden centers will have soil, manure, and compost on sale.

Don't forget to take note of your season. Ensure you've written down what you grew, where, and how many. How did it fair? What did not do well? How much did you harvest? You will thank yourself next year!

Support Your Plants

Different varieties of fruits and veggies in your garden may need some type of physical support structure during the growing season.

For example, tomato plants are very top heavy and will collapse under their own weight. Many gardeners use a tomato cage to hold them upright.

Peas and pole beans are vines and require something to climb such as a trellis or fence.

Squashes, melons, and cucumbers are also vines and can take up less space if provided a structure to grow vertically.

Composting in Bear Country

Most backyard composter models are not fully bear-proof. Unmanaged compost will produce a smell that will primarily attract bears. With proper care, a compost unit will not actually smell badly.

Proper care includes ensuring a mix of brown and green materials and aeration through stirring.

Never add meat, fish, dairy, oil, cooked food, or large amounts of fruit. These will attract animals before they decompose.

Ensure you also have a clear sightline as you walk toward your composter.

COMPOSTING 101

Why Compost?

The are many reasons to start a backyard compost:

- It is easy!
- Organic waste can make up 30-50% (or more) of household garbage. Composting at home lowers household waste volumes.
- Composting keeps nutrients in the soil for your plants, and out of landfills.
- Your plants will be healthier and more productive when grown in soil rich with composted nutrients.
- Compost rich soils hold water better, meaning less time watering and less water used.
- Compost can allow you to make new gardens in sites with poor soil.
- Keeping compost out of landfills will help to reduce methane production, a significant contributor to climate change.
- Keeping compost out of landfills will extend the landfill's life.

Once you start composting and see the results, you'll wonder why you didn't always compost. Over time, you'll create rich soil that smells like a forest...

Getting Started

Choose a location: Make sure it is convenient for you. A place that will receive some sun throughout the day. It should be at least 2 feet from any structures and in a well-drained spot.

Decide on a pile or bin: Composting doesn't require special equipment. You can start a simple pile in your backyard or purchase a bin for it. A bin may discourage animals from investigating. Compost bins can also be made from wiring together wooden pallets.

Load it up with materials: Composting works by mixing two types of wastes: green (nitrogen) and brown (carbon). Fill your compost with 60% browns and 40% greens. As you continue to compost, add brown leaves to help maintain a balance of carbon and nitrogen.

Add water: You might need to water the compost from time to time. The microbes need moisture to survive – but not too much. It should be as damp as a wrung-out sponge.

Turn your pile: Once a week, use a shovel or pitchfork to turn your compost, breaking up clumps and infusing oxygen into the material so your microorganisms thrive. You'll keep your compost healthier and it will work faster.

Time: Normally, finished compost can take from six months to one year to produce. This will depend on the level of care provided. You can help speed up the process by chopping any large materials into smaller pieces, turning the compost regularly, ensuring a good mix of greens and browns, and keeping it moist.

WHAT TO COMPOST

BROWNS (CARBON)		GREENS (NITROGEN)	
Cardboard	Shred to avoid matting	Chicken manure	Excellent 'activator'
Corn cobs	Best if chopped up	Coffee grounds	Filters may also be included
Eggshells	Best when crushed	Flowers	Chop up long, woody stems
Garden plants	Use disease-free only	Grass clippings	Layer thinly, avoid matting
Leaves	Breaks down faster when shredded	Green comfrey leaves	Excellent 'activator'
Newspaper & papers	Avoid glossy paper and coloured inks	Fruit & veggie scraps	Add with dry carbon items
Pine needles	Acidic; use small amount	Seaweed & kelp	Apply in thin layers; good source for trace minerals
Sawdust pellets	Layer to avoid clumping	Table scraps	Add with dry carbon items
Shrub prunings	Slow to break down	Tea leaves	Loose or in non-plastic bags
Straw or hay	Straw is best	Weeds	Only if not gone to seed
Wood ash	Only from clean materials; sprinkle		
Wood chips	Use sparingly		

Never Compost

The following materials should never be added to a compost. They will create smells that attract animals, and/or may contain parasites or toxins:

- Meat, fish, or bones
- Fatty foods, grease, and oils
- Dairy products
- Bread, pasta, cakes, etc.
- Dog or cat waste, including cat litter
- Diseased plants, and weeds with mature seeds
- Chemically treated wood
- Walnut shells
- Personal care products and plastics

Composting Remedies

PROBLEM	CAUSE	SOLUTION
It smells like ammonia!	There is too much nitrogen.	Mix in more browns and turn the pile over. Add some clean soil.
It smells like rotten eggs!	It needs more oxygen.	Turn over the compost more often. Add dry materials to create air pockets.
The pile is way too wet and not hot	The pile is too small.	Collect more materials and enlarge the size of the pile or bin contents.
There is nothing happening here...	Add nitrogen, materials are too big, and/or more water needed.	Add greens and veggie scraps, cut up kitchen waste into smaller pieces, add moisture and turn over the pile.
Too many insects or animals pestering it!	Odour could attract pests, the wrong materials might have been added.	Cover food waste with leaves, straw or soil to help keep down smells. Never compost fish, meat, or dairy.

Do I Need to Feed My Planter?

Any plant that lives in a container will require nutrients from adding fertilizers. In the course of their lives, plants need more nutrients than what is found in the planter.

Store bought herb and veggie planters normally contain a ‘slow-release’ fertilizer. This means feeding your plants is already done for you!

If you reuse a planter for more veggies, you’ll need a nutrient top-up. There are many options at hardware stores and you can even make your own compost tea by soaking compost, leaves/weeds in the water you use for the planter!

CONTAINER GARDENING

Location

When you bring a veggie planter home, your first thought might be: “Where should this go?”

The answer will depend on what veggies are in your planter. This chart shows the sun requirements of the common fruits and veggies you may have now, or in the future.

Low Sun 3-4 hours/day	Swiss Chard, Lettuce, Parsley, Arugula, Kale, Cabbage
Medium Sun 4-6 hours/day	Beets, Carrots, Peas Potatoes, Broccoli , Radishes, Turnips
High Sun 6-8 hours/day	Peppers, Tomatoes, Beans, Eggplant, Strawberries, Cucumbers, Squash

And don’t forget one of the best features of a planter garden: it can be moved! If you need to relocate a planter, ensure you’re not drastically changing conditions (e.g. sun) as that can shock the plant.

What if you have a mix of high sun, low sun? Turn the shade plants away from the light. If the plants are wilting or leaves look "sunburned" then the soil is too dry or your plants are getting too much light.

Care

Check for dead stems or weak growth and remove it to help prevent disease and mold. You can pinch off dead leaves but plants often put out new growth! Some plants, like tomatoes, benefit from being trimmed (pruned) so they put energy into fruits instead of leaves. Pinch off the side shoots or tallest stem a tiny bit to get a bushier plant. Use herbs the same way, by pinching or snipping off the biggest leaves to let new ones grow.

While we like to enjoy the look of a plant ready to eat, don’t admire it too long without eating it! Fruits and veggies can spoil quickly if we don’t use them.

Many of these plants will start to die back by the end of the summer. Don't be afraid to remove plants past their prime (like lettuce) and replace it with plants from a garden centre or seeds that will sprout if you keep them warm and moist.

Water

Depending on the location of your planter, you will likely find it dries out quickly. It is important to check the soil in the planter every day to gauge when to water, especially on hot days.

One of the best ways to know if your planter needs water is to stick your finger 2 inches (5 cm) deep into the soil. If the top two inches are dry, it is time to water!

When it is time to water, do so thoroughly. Your planter has drainage holes in the bottom to stop water from pooling. Slowly water the planter until you see water coming out of the bottom.

CREATING PLANTERS

If you're happy with your veggie garden planter, you might decide to add more planters to your space or reuse this planter next year. Here are some tips for new or reusing planters:

Planters: Just about any container can be made into a planter! Repurpose old items, check out garage sales, get creative! (*If you want to grow heat-loving plants, choose a darker container that attracts more heat*).

Drainage: Increase or add drainage by drilling, punching, or carving at least 1/2 inch (1 cm) diameter holes.

Light: Ensure you have the right amount of light for the plant you'd like to grow.

Food: You need to feed your soil to feed your plants. Slow-release fertilizers are available from most hardware stores. You could instead use a liquid fertilizer mixed with water every two weeks.

Plants: Decide what you want to plant before looking at a nursery or seed packages. Consider the number of pots, sizes, and locations. Take a picture of your planters and bring it with you when plant shopping.

Neighbours: When choosing plants for your planter, make sure that they get along. The plants in one pot should require the same amount of light and moisture.

Plant Tags: When buying plants, read the tags! They tell you how much light, water, and food they needs. The tag also lists the plant's shape and size, which are important to consider for small and medium planters.

Potting Soil: Don't fill your planter with anything but good potting soil. It is specially designed to hold water, nutrients, and reduce disease. And don't be shy about filling up the planter. More soil equals a better ability to retain water and provides a larger margin for error for both watering and feeding plants.

Patience: Unfortunately, when we have more plants, we see more plants die. Even expert gardeners sometimes kill plants without meaning to! If you see dead parts on a plant, pinch them off and see if the plant puts out new growth. If the plant continues dying, remove it. Try to find out what the problem was (too dry? too wet? too hot?) and make adjustments.

Container gardening examples

Credit: Laura Fullerton

Seed Saving

Regardless if your plants were grown in a container or a garden bed, many varieties have seeds that are easy to collect and preserve for the next growing season.

Some seeds only require drying out before they are ready to be stored. These include: peas, beans, marigolds, radishes, dill, cilantro, and nasturtiums.

Other seeds need to experience a fermentation stage, including tomatoes and squashes. This can be replicated by soaking them in water for two days. The seeds that sink should then be dried for later use.

Label and date all seeds types and store in a cool, dry area.

Preserving the Harvest

Freezing, canning, cold storage (e.g. root cellar or similar), and dehydrating are tried and true ways to keep your harvest in your kitchen throughout winter. Here are some guides help you preserve the harvest:

1. Bernardin Guide to Home Preserving by Bernardin
2. The Ultimate Guide to Preserving Vegetables by Angi Schneider
3. The Farm Girl's Guide to Preserving the Harvest by Ann Accetta-Scott
4. Homegrown Pantry by Barbara Pleasant

ABOUT US

Georgian Bay is part of Lake Huron and the Great Lakes Basin. It is known as Spirit Lake (*Mnidoo-gamii*) by the Anishinabek peoples and was named a World Biosphere Reserve by the United Nations Education Scientific and Cultural Organization in 2004.

The Georgian Bay Mnidoo Gamii Biosphere is a non-profit charity that works to protect the environment, create vibrant communities, and support a healthy economy. Working with many partners across the region, GBBR relies on grants, contracts, memberships, and donations to do our work.

Join us today! gbbr.ca

Sustainable food systems are an important part of being a UNESCO biosphere reserve. A key factor in sustainable food systems is knowledge sharing and building capacity for people to grow their own food. Since 2008, GBBR has led and partnered on food and garden programs with dozens of partners.

Gardening is a rewarding experience with many benefits. It is a powerful way for people of all ages to connect with nature, it can have significant environmental benefits, and can even be an economical option for fresh produce.

ONLINE RESOURCES

1. **The Georgian Bay Biosphere**
   www.gbbr.ca/gardens
2. **The Old Famer's Almanac**
   www.almanac.com
3. **Ontario Seed Company**
   www.oscseeds.com
4. **Family, Food & Garden**
   www.familyfoodgarden.com
5. **West Coast Seeds**
   www.westcoastseeds.com
6. **Planet Natural Guide**
   www.planetnatural.com

HAPPY GARDENING

Gardening on any scale is healthy for our bodies and minds. We wish you lots of luck, fun, and success with your garden!

Please take a minute to share a picture of your garden with us. We'd love to see your green thumb!

United Nations Educational, Scientific and Cultural Organization

GEORGIAN BAY BIOSPHERE MNIDOO GAMII