

Start Your Organic Garden Now

A simple guide to setting up and planting your 100 square foot garden!

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The What and Why of Organic Gardening?

What really began as a fringe movement in the 1940s with the likes of Lady Eve Balfour in England and Rodale Press in the United States has now become a multi-billion dollar segment of the food industry. Between then and now, hippies and eccentrics carried the organic torch through the 60s, 70s and 80s, mostly in little co-operative stores at a time when most people equated organic with limp, misshapen and bug-riddled. Through the 1990s the organic sector grew in double-digit increments. Numerous independent certification companies arose to give the companies the organic certification. By this time, there was big money involved and in the United States, the United States Department of Agriculture (USDA) stepped in and took over. In their new organic rulebook, they wanted to allow municipal sewer sludge as fertilizer, genetically modified seeds, and other things that long-time organic folks found appalling. The backlash was enormous, with the USDA receiving the most comments on a single issue, mainly negative, in its history. They backed off for the time being, but nevertheless, the only seal of approval is the USDA Certified Organic stamp. In Europe, the European Union has its own certification as well.

As the organic segment of industrial agriculture grows it becomes less relevant to the individual who wants more than mass-produced food shipped in from far off places. Does the “O” word continue to mean anything, with labor offshored to the lowest bidders, standards lowered and competition eliminated through price wars until their product becomes organic by default?

A monumental shift has occurred, with Big Organic taking the low road and little organic taking the high road. This guide is about little organic, where organic is about sustainability, care of the earth and soil, and trying to leave something of enduring value for future generations. We will leave the tweaking of definitions by the Big Organic People in political backrooms and courthouses.

Luckily for us, we can ignore all the fighting and maneuvering because we are organic gardeners and we don't have to get certified. The only authority we must answer to as we grow delicious, wholesome fruits and vegetables is Mother Nature. As home gardeners we not only have the opportunity to garden organically but to practise it in a way that reduces labor, reduces outside inputs, creates meaningful relationships that transcend species boundaries, and enjoy superior quality, fresh produce.

Welcome and enjoy!

Getting Started On Your Garden!

Before you begin, read this guide from cover to cover. It is designed to give you a complete introduction to organic gardening, and as such, it touches on many subjects. But you don't need to know all that stuff or even understand it to start gardening.

I'm going to give you a hint right now: The two most important parts in this whole guide are Site Selection and Soil Preparation . The forces of nature are mighty powerful and we need to use them to our advantage, especially the sun. The ideas in Site Selection will help you choose the best garden spot at your location. The section on Soil Preparation contains ideas to help turn the raw talent of your site into a superstar garden. With these two all-important pieces in place, you'll have the best start possible. Every journey begins with the first step. You're about to take the first two steps, armed with practical, time-tested advice. You will succeed. I know you will.

Just One More Hint!

I can't help it. I really want you to succeed. I'm the type that doesn't take my own advice because I can't wait to start. So for those of you who can't wait to get started, here's what you'll need: a round point shovel, a digging fork, some compost, some fertiliser, some seeds (I recommend radish, spring greens, any other fast-maturing varieties), some starts (veggies, flowers), a hose and a nozzle. That's it really. So get out there and get to work. But take my advice and read this guide when you're taking a break. And please, wash your hands first!

Site Selection

Before you even begin to turn the first shovelful of soil, you want to choose the best site possible for your garden. While sunlight is definitely a very important factor, since without it we are nothing, we need to consider several other items as well. This process is called Sector Analysis. A "sector" is anything that can have an influence on your garden. Your job is to first identify all sectors, then to decide what influence they might have on your garden, and finally to see if you have any influence yourself over the sectors. So, let's make a list of sectors.

Sun Sector

Of all sectors, sunlight is one of the three most important. You need a minimum of six hours of direct sunlight for your garden. There is no substitute. So take a look around. In the northern hemisphere, the sun lies in the southern sky. In the southern hemisphere, you'll find the sun to the north. From here on out we will use the term "sun direction" to refer to where the sunlight is coming from. We don't want to be "hemisphere-centric" and upset our friends on the other side of the planet!

To begin, recall what season you are in as you look at prospective garden sites. Look around and take note of any objects that might block the sunlight. The sun is lower, with a smaller arc in the winter, so be aware that a site may get full sun during the summer but be in shade most of the winter. This could be important if you plan to have a winter garden. Plus, the soil will take longer to warm up in the spring.

Of course, you may have no choice where your garden grows. In the city or suburbs, there may only be one possible site. Knowing everything about that spot will be even more important. Remember, too much sunlight can be modified by shade cloth, but there is no remedy for lack of sunlight.

Soil Sector

Soil is also very important. We are asking it to support our plants and provide us with tasty, nutritious produce. The more we know about our soil and are able to make it an inviting home for our plants, the better chance we have for success.

A simple way to become acquainted with your soil is through observation. Soil charts usually show a triangle with the sides being clay (particles smaller than 0.002 millimetres diameter), silt (particles from 0.002 mm to 0.05 millimetres diameter) and sand (particles from 0.05 mm to 2 millimetres diameter). All soils are a combination of the three, with the ideal being about 40% sand, 40% silt and 20% clay. Clay is responsible for water and nutrient retention. Heavy clay soils drain poorly. Sand is responsible for drainage. Sandy soils drain quickly but lack nutrients. A balanced soil will hold water, yet drain well, and contain plenty of organic matter that gives it a crumbly texture.

The Squeeze Test

One way to evaluate your soil is to take a handful and squeeze it. Add a little water if it's dry. If it falls apart when you open your hand, your soil is sandy. If it stays solid, try to squeeze it and make a ribbon. If it won't make a ribbon, it's loamy sand. If you can make a ribbon, it's clay. The longer you can make the ribbon, the more clay it contains. If it feels smooth, it's a silty clay; if it feels gritty, it's a sandy clay. Being aware of your soil type will help you know what to add to your soil and give you an idea of how to care for your garden. Amendments can help alter the structure of your soil, but it's harder to alter the intrinsic soil type.

The Soil Shake Test

A fun way to get an idea of your soil's composition is to do the Soil Shake Test. First, you'll need a glass jar with a lid. Half gallon (2 litre) or gallon (4 litre) jars work best, though you can use a quart (1 litre) jar. Next, get a shovel or trowel and go to your prospective garden site. Scoop up some soil from the site and fill the jar about halfway. Then fill it with water, leaving some room for sloshing. Now gently shake the jar until all the soil dissolves in the water. It may take a while to break up clay chunks. Now put the jar in a safe place and leave it undisturbed for several hours. When you return, notice that the soil components have settled separately. Now you have a good idea of your soil's composition. This knowledge will help you when you prepare your soil.

Note: Before you take a soil sample, scrape away any loose leaves, twigs, or other materials on the surface.

It may seem funny, but I've seen people stand in their garden and contemplating all sorts of things, without ever bending over or kneeling down to take a closer look. So don't be afraid to get down and dirty and look at everything, even with a magnifying glass.

Water Sector

The water sector accounts for how much water the site gets, where it comes from, its quality, and how long it stays on the site. The sun sector and soil sector influence the water sector through evaporation and retention/release respectively.

Rainfall is the first water source to consider. It's nice to know the yearly average of rainfall, but it's more important to know when it falls. Does it mostly fall in the winter, when you don't really need it? Does it fall frequently as gentle summer showers? The rainfall patterns in your area will determine how much supplemental water your garden will need and what type of irrigation systems you will install.

Ground flow of water also influences a site. You might have creeks, irrigation ditches and drainage ditches. Water can also move underground through the soil. Our homestead experiences large volumes of underground water movement during winter. By performing numerous shake tests, digging down up to two feet, I found that our property sits on a great rock shield, sloping toward the creek. Winter rains saturate the ground, hit that rock shield, and move laterally through the soil. This explains why cherry trees do so poorly here (they hate wet feet in winter) and why our creek flows so well all year-round (there's a constant flow of water over the rock shield).

On urban and suburban sites, water influences include downspouts and how you or your neighbours have altered the terrain through landscaping or planting.

Wind Sector

What direction do storms come from? Where are the prevailing winds? Steady or strong winds can stunt growth as well as dry out the soil faster. Fences and specially planted areas can help slow or deflect the wind.

Noise Sector

What, if any, are the noises and where do they come from? What times of day? Undesirable noises can shatter a pleasant gardening experience. Imagine getting up early one summer morning. You make a cup of tea and go out to your garden to weed a little before going to work. Suddenly, your next-door neighbour starts banging on some metal. Can you site your garden to reduce noisy intrusions? It's not always possible, but worth thinking about.

Other Sectors

Anything that has an influence on your garden can be considered a sector. So, there could be a wildlife sector, a bird sector, a pest sector, etc. Think about everything that might influence your garden and how you can maximize or minimize its influence.

Creating Your Garden Bed

Once you've picked a spot for your garden, you'll need to mark the corners with four wooden stakes, unless you've decided to make a round bed. But the easiest shape to start with is a simple rectangle, especially if you're going to build a frame around it. A good size to start with is 20 feet (6.1 m) long by 5 feet (1.5 m) wide for a total of 100 square feet (9.3 square metres). You can reach the center of the bed from both sides for weeding, fertilizing and harvesting. And with 100 square feet, it's easier to calculate how much of each soil amendment to use. Once you've created your garden bed, never walk on it again. After you've created a nice, aerated soil, you don't want to compact it. Each year, your soil will improve and you'll only have to loosen it gently with a fork in the spring. Which brings us to soil preparation.

Soil Preparation

Now that you've selected and marked your garden site, you're going to prepare the soil. Before you do that, though, remember the results of the Shake Test and Squeeze Test. What type of soil do you have? Soil that drains well, such as sandy loam, can be worked earlier in the spring than clay soils. The worst thing you can do is try to work a heavier soil too early in spring. It will be clumpy and lumpy and stick to your shovel. Wait until the rains have tapered off and the weather is warmer.

When we prepare a garden bed, we're trying to improve the soil composition and the soil structure, often referred to as tilth. Though we can't change the clay, silt and sand content of the soil, we can add organic matter. Organic matter builds up naturally, very slowly, over time. It comes from leaves, bits of wood and twigs, dead bugs and roots in the soil. Though only about 10% of the soil, it is very important for soil structure. It helps keep the texture, or tilth, of the soil loose and crumbly. A well-structured soil is about half solid matter and half air space. Soil with good tilth allows plant roots to reach down and find nutrients and water; and it provides plenty of air for all the little creatures that live in the soil and without whom good soil would not exist. More on them later! Luckily, we can add organic matter such as compost and animal manures to our soil to improve its tilth.



To Dig or Not To Dig?

Some gardening styles advocate a no-dig philosophy, reasoning that nature doesn't turn the soil and neither should we. Some styles, such as the Biodynamic/French intensive, advocate double digging, which loosens the soil down as deep as two feet. To be honest, my gardening style has evolved not along philosophical lines but according to criteria such as getting older and lazier. I've double dug many gardens with great results. Currently, I loosen the soil in my garden beds with a digging fork each spring. Then I amend the top with composted manure and amendments such as bone meal, feather meal, minerals, bat guano, etc.

If you're starting with unimproved soil, I would recommend at least some turning of soil and mixing in of compost, especially on an urban or suburban site where the soil is likely to be compacted. It will improve the soil's tilth. Here's how you do it.

With a digging shovel, start at one corner of the garden bed site. Imagine looking down on the rectangle from above. If you're right footed, start at the upper right corner. Take your first shovel full of dirt and turn it over. Use the point to break it up. Then move backwards in a straight line. When you get to the end, start again at the top of the rectangle, right next to the row you just dug. In this manner, you can methodically dig the bed without stepping on your previous work.

Depending upon how clumpy it is at this point, you may want to wait a day to let it dry out a bit. Then, with a steel rake, begin to smooth the surface of the bed. You can use the side of the rake or your shovel to break up chunks of dirt. You can spend a lot of time smoothing out the bed, but one hint. Don't start pulling rocks and dirt clods out of the bed. You'll end up with piles of rocks with no home. It's extra work and unnecessary. Just use the rake to distribute them evenly over the bed. One exception is when you're preparing a fine surface to directly sow very small seeds such as carrots.

Now you will decide what to put on the bed. If it's a brand new garden, it's almost impossible to put in too much composted organic matter. Be wary of compost that contains tree bark, though. It can increase soil acidity and lock up nitrogen as it decomposes, robbing your plants of the vital nutrient. Go to your friendly organic gardening center or local organic animal farm (if you're so lucky) and pick up some compost or manure and any amendments that the garden center recommends.

This may seem like a lackadaisical approach to gardening, and it is! But here's my take on it. If you make a decent effort and do a decent job at preparing your garden beds, you're going to get decent results in the form of delicious, home grown produce. It's really hard to mess up. I assume that in choosing to garden organically, you, the reader, are adopting a philosophy that goes beyond just wanting wholesome, chemical-free produce. Perhaps you're seeking a refuge from a fast and furious world, a place, however small, where the forces of creation and life work at a different pace. Or maybe if, and especially if, you want to garden with your children, grandchildren, or youth group, being terribly meticulous and worried about details can be so boring and such a turn off. All the action is happening with the seeds and in the soil. With over thirty years of home gardening experience, I've seen that the desire of life on this planet to spring forth is so strong that we gardeners mainly have to prepare the spot and move aside. Sowing every seed is as much a reaffirmation of hope as it is a direct effort to obtain food. The time to start gardening is now, however mixed the results. With good intentions and an open mind, anyone can work with nature and improve their skills over time.

Of course, feel free to be meticulous. All I'm saying is that nobody should be afraid to plant a garden because of too many details or because they think that not following some protocol will result in failure.

Irrigation Systems

How will you water your garden? The easiest and most economical method is the good old garden hose. But it's not perfect. In fact, in all my years of organic gardening and professional landscaping, I have not seen the perfect irrigation system. In this section, we'll look at your watering needs, different ways to water, and things to keep in mind when designing a watering system.

First, Back To The Soil

The composition of your soil will determine how much water it can hold. It also influences how fast the water will sink in and how it will flow through the soil. Knowing what your soil is like will help you set up your irrigation system and water more efficiently.

Other Influences On Water

Beside the soil, other things can influence the moisture content of your soil. Recalling the exercise in Sector Analysis, the amount of daily sunlight will have an effect, as will local patterns of rain and clouds. Wind, too, can exert a drying effect on the soil. For these reasons, no watering schedule can or should be adhered to strictly since conditions will change that can result in under or over watering your garden.

Garden Hose

The simplest watering set up is a garden hose attached to an outdoor faucet/tap. It's a perfectly suitable way to water a small garden. To make it better, invest in a watering wand or sprayer of some sort that has a shut off valve. That allows you to control the flow of water from your end of the hose. Some of the adjustable heads are nice because you can set them to "shower" to overhead water young seedlings or "dribble" to water larger plants at their base. With the shut off valve, you can adjust the flow of water according to how fast the soil can absorb it.

Soaker Hose

These are hoses made from some sort of porous material. You turn them on like a hose but the end has a cap and the water sprays out from the tiny holes in the hose. These work pretty well in garden beds and will last even longer if protected from the sun's ultraviolet rays by burying them very shallow in the soil. One advantage of these is that they emit water slowly so that you don't get flooding if you forget to turn them off. Plus you can snake them through the garden bed without kinking them.

Another type of soaker hose has a seam running the length of it with tiny slits cut in the seam. The water drips out of the slits. These are more economical, but work best in straight lines. They tend to kink otherwise.

Sprinklers

Sprinklers are generally unsuitable for smallish gardens. The little ones that have a small blue or red metal dome with holes emit large droplets and the flow rate out of them is too great. The back and forth type don't work very well in small areas. They tend to get stuck when the water pressure is low.

Drip Irrigation

Drip irrigation works well but can easily get out of hand. I recommend doing some research and finding an expert at your garden center that can answer your questions. Read all the free literature available and books from the library. There are hundreds of parts to choose from, but any drip system consists of four elements:

Filters

A filter captures silt and particles and prevents them from clogging the drip system. Every system should have a filter regardless of the water source. They aren't too costly and they eliminate potential clogging of the system.

Pressure Regulator

Regulators are rated by pounds per square inch (psi). Many drip irrigation parts are designed to perform at certain pressures, usually 25 psi or less. High pressure can break drip irrigation parts, or cause them to shoot off. Most municipal systems have higher pressure. If you want to know your water pressure, you can buy a pressure gauge and attach it directly to your faucet/tap to get a reading.

Drip Tubing

Drip tubing transports the water to the site. Some tubing has holes or emitters built into it (dual purpose) while some tubing is solid. Solid tubes are called supply lines. Smaller tubes of one-quarter inch (.625 cm) are called spaghetti lines.

Emitters

Emitters allow the water to exit the system at a certain flow, such as gallons per hour (gph). Of the hundreds of emitters available, there are two basic types. Non-compensating emitters do not allow for changes in elevation, meaning that emitters at the top of a rise will receive less water than those at the bottom. Compensating emitters are designed to deliver a consistent flow regardless of changes in elevation.

Don't Do Drip Until You Understand This Section!

I really can't recommend it strongly enough that you read and ask lots of questions about drip irrigation before you try it, unless you have a drip expert to help you. Even then, learn the parts and how they work so that you can maintain and repair your system when the time comes. Therefore, don't try it until you understand the next paragraph.

What drip systems gain in efficiency, they lose in adaptability. Say you grow tomatoes every two feet and you set up a three-quarter inch (1.8 cm) main line, then every two feet you connect two feet of one-quarter inch spaghetti tubing with built-in half gallon per hour (gph) emitters every six inches. It's perfect. But next year you direct sow beets in that space. What do you do with the tomato set-up? Store it until you plant tomatoes in that configuration again? Drip irrigation parts don't come apart very well, unlike Lego, so that's not really an option. Even now, I feel myself being sucked into the drip irrigation vortex. So, I'll stop after I issue one warning and one handy tip. The warning: drip irrigation optimists chase the perfect set-up like the Holy Grail, believing they're just one vision away from it. And they probably have a big drip parts graveyard behind their garden sheds. Resist the urge to splurge on drip irrigation until you have a good picture of what your garden will be like and how all those drip parts perform. Now for the handy tip: There is one drip irrigation set up that I can recommend and will describe. It uses spinning micro-sprinklers on plastic stakes. These sprinklers emit small droplets at a fairly low flow rate and their spread is about right for a 5-foot (1.5 m) wide garden bed. In a twenty-foot (6 m) long bed, you can use three or four of them. If your plants get too tall, you can raise the sprinklers by making a sprinkler stilt. Get a four-foot (about 1.2 m) piece of white three-quarter inch PVC pipe and pound it into the ground. Then take your sprinkler out of the ground and drop the stake into the end of the pipe.

Timers

Sometimes you might not be around to water your garden. It's time for a timer. They are all made of plastic and eventually break. With timers, you get what you pay for. The cheapest ones have fewer options and don't last very long, sometimes just one season. The more expensive ones can hurt the wallet (\$30 and climbing rapidly) but they can be programmed for multiple tasks and are more durable. Treat all timers with great care and keep them out of the sun and they will last much longer. I've had expensive, new (3 months old) timers become brittle and crack at the hose connection from intense sunlight. Take a rag or old t-shirt and tie it around the timer to protect it from the UV rays.

The simplest timers connect to the faucet/tap on one end and the hose connects to the timer on the other end. You set the time you want the water to run, just like on a kitchen timer, and it shuts off at the end of that time. They operate on a coil mechanism and require no batteries.

If you want the water to go on and off when you're not there, buy a programmable timer. They also attach to the faucet/tap. You can set the water to go on and off at specific times. The cheaper timers only allow one start and one stop time, though you can choose the days to water. Better timers allow you to programme multiple start and stop times for each day. This is very handy when you have baby plants that could benefit from a spritzing a few times a day during the summer.

Seeds

Seeds are fascinating. Most people take them for granted if they think of them at all. Yet they are probably the closest any of us come to a miracle on a daily basis. Each seed, genetically much more complex than humans, contains all the information necessary to form a plant, cause it to grow and form reproductive parts, and produce a replica of itself that contains the information to do it all over again. It passes instructions on to its adult plant self that cause the plant to extract certain minerals and nutrients from the soil and organize them into a unique, recognizable form.

Understanding something about the world of seeds and the transformation of the seed business over the past century will help you decide whether to start from seed or buy plants, which varieties of seed to buy, and from whom.



Since the early 1900s, the number of garden seed varieties available in the United States has decreased by 97%. The trends toward industrialization, specialization, and corporate control greatly influenced the world of farming and gardening. Most of the lost fruits and vegetables were what we now call “heirloom” varieties, seeds that had some special trait, such a good flavour, ability to withstand wet, cold, drought, pest resistance, etc. Yet many are still available and groups such as Seed Savers’ Exchange are working to reintroduce old varieties. Following are a few things to know that will help you choose your seeds, especially if you want to save seeds from your garden to plant next year.

Open Pollinated Seeds

This is a type of seed that you can save and plant the following year and be certain that you will get the same flower, fruit or vegetable. Heirloom seeds are in this category. Seed packets don’t usually tell you if they are OP, but they are usually OP if they don’t say anything.

Hybrid Seeds

This seed is a cross between two parent plants. The seed you get in the packet is the first generation offspring. On the packet, next to the variety name, will appear the words F1 Hybrid. Planting seed from these varieties usually will not give you the same flower, fruit or vegetable the next year. You’ll get something completely different. If you’ve got limited space, it’s not recommended to plant seeds saved from F1 hybrids.

Plant Variety Protection (PVP)

This seed is mainly found in commercial farming in grain and grass seed. As the name implies, the variety is protected by law, and the grower is not allowed to plant the seed the following year, even though it’s a perfectly good seed. This may seem twisted, but that is the nature of agribusiness in the 21st century.

Genetically Modified Organisms (GMO)

This seed has been created in the laboratory and has strands of DNA from completely different life forms inserted into it. The purpose is mainly to aid large-scale agriculture in different ways, such as confer chemical resistance to a plant or cause a plant to manufacture a substance it wouldn't normally produce. In the United States, the companies doing this are not required to tell anyone which crops are GM. These GM seeds are used primarily in staple crops such as potatoes, corn, soy, and canola. They mainly find their way into processed food products. The USDA Organic Rule does not allow GMOs to be used in organic products.

Choosing Your Seeds

There are many small organic seed companies out there that would love, and desperately need, new customers. As the organic sector in agriculture grows, it more closely resembles big agribusiness. There is a distinct shift now in which Big Organic goes one way and little organic goes another. Little organic has always been and will remain the realm of family farmers driven by ideals (though making enough money to live on doesn't hurt!). Try to support seed companies that buy from little organic family farms.

Planting Seeds

Planting your own seeds provides much wider access to a variety of flowers and vegetables than is available at the garden centre. Also, it's quite a thrill to be involved in the entire process, from seed to seed.

When To Plant Your Seeds

Some seeds you can plant directly in the garden after the danger of frost has passed. Some seeds need to be started indoors in areas where the growing season is too short for the plants to mature from direct sowing. In this case, the seed packets say something like: "Sow indoors 6-8 weeks before last frost." You can find out what your last frost date is by asking your garden center or university's agricultural extension office.

Making Or Buying Potting Soil

You can either buy or make your own potting soil. If you buy it, beware of mixes that contain composted tree bark. It's not good for seedlings and it's too chunky. Look for soil that's especially for starting seeds. Making your own potting blend is easy. Here is a basic recipe. Wear a dust mask, available at a hardware store, while mixing, and keep dust to a minimum.

1 part vermiculite

1 part milled sphagnum moss or peat moss

1 part perlite

Make a fertilizer mixture from equal parts of rock phosphate, greensand, blood meal. Add 1 Tablespoon of the fertilizer mixture per 3 quarts of soil blend.

Break up the sphagnum or peat and wet it thoroughly before adding the others. This can take several hours.

Containers

The easiest containers to start with are empty six packs or 2 inch (5 cm) pots. Buy some new ones or get some used ones from the garden center. It is recommended to wash out and sterilize used ones in a mild bleach solution.

Filling The Containers

The best way to fill your six packs or pots is first to find a bucket or tub to put your potting soil in. Something wide with low sides is ideal. You set your six-pack or pot right on the pile of soil and pile the soil on. Agitate the six-pack or pot so that the soil settles in nicely. If it settles down, add some more soil. Then with the side of your hand or with any straight edge, wipe the excess soil away. The soil should be flush with the top of the container.

Next you will thoroughly water the potting soil before you plant. The potting soil should already be fairly moist. Let the water soak in for several minutes. Then with thumb or finger, make a slight dent in each cell of the six-pack or pot. The rule of thumb for planting seeds is plant them as deep as they are wide. Small seeds such as lettuce and broccoli barely need to be covered.

Bigger seeds like pumpkin and beans can be planted deeper. Place up to three seeds in each cell or pot. Then sprinkle more soil on top and firm it down with your finger. Finally, water the soil lightly again.

It's good to plant more than one seed in case it's a dud. But if they all sprout, you'll need to cull down to one seedling. Rather than pulling them and disturbing the roots, just snip off the unwanted seedlings with a small pair of scissors.

Watering Seeds

The ideal condition for new seedlings is moist but not soaked. Avoid the temptation to over water. Rather than water on a fixed schedule, observe the moisture content and water as needed. Watering too much can cause “damping off”, leading the seedlings to rot at soil level and fall over.

Keeping Your Seedlings Warm

All seedlings benefit from consistent warmth. This can be achieved by investing in a heating mat, which heats from below, or a heat lamp, which heats from above. A sunny window can also do the trick, but not as effectively.

Feeding Seedlings

Sometimes it is necessary to give your seedlings some extra food. The smaller their container, the faster they use up the fertilizers in the soil. Sometimes, too, the weather is too cold to plant and you have to keep the seedlings indoors longer. An ideal product to use is organic liquid fertilizer. You can mix it with water in a watering can and water with it. Another way to fertilize plants is by foliar feeding, which means feeding the leaves. You just put the fertilizer mixture in a spray bottle and spray the leaves. They absorb the nutrients from the undersides of the leaves so you have to make sure to spray the bottoms of the leaves.

Planting Out

When the time comes to plant out, the first thing you want to do is determine where you're going to put your seedlings. The backs of the seed packets tell you how far apart to make the rows and how far apart to put the plants within the row. These distances are usually determined for commercial settings, meaning that the home gardener can plant a bit closer, about 10% less than the packets say. Resist the urge to plant closer. A common weakness, with seasoned gardeners as well as beginners, is the inability to imagine that tiny cabbage plant as a beauty with a 3-foot (.9 m) wingspan. Everything in the garden will fill in, even though it doesn't seem that way at first.

With a gardening trowel or your hand, make a hole in the appropriate place for each seedling. Make it only as deep as the soil/root plug.

To remove the seedlings from their containers, there are two methods. With six packs made of thin plastic, you can push up from the bottom and use a flat stick or kitchen knife to help get it out. With larger pots, position your index and middle finger on either side of the seedling. Then turn the pot over and dump it out. Catch the plant and soil in your hand with the seedling poking out from between your fingers. Whatever you do, NEVER pull the seedling's stem to remove it.

Once you have removed the plant, you will notice a soil plug with little white roots running along the side of it. Or if the roots are less developed, the soil plug may even fall apart in your hand. Don't worry about it.

Before you plant a plug that is "root bound", with lots of roots forming a dense layer, gently break up the root ball. Otherwise the growing tips may not find their way out into the soil and the plant will become stunted.

For a plant whose soil plug breaks up, merely hold it by the stem at soil level and lower it into its hole. The same goes for formerly root bound seedlings. The part of the plant where it meets the soil is called the crown. Most plants don't tolerate their crown being planted below the soil line. As you place the seedling in the hole and gently press soil around it, make sure the crown is at the new soil level. Then gently water around the plant. This eliminates air pockets and makes sure the roots have good contact with the soil.



Direct Seeding

As the season progresses or in warm climates, you can direct seed, which means sowing seeds directly into the garden. Lettuce, greens, radishes, and crops that can overwinter such as beets, carrots and cabbage are suitable for direct seeding.

In a home garden, you can make a shallow furrow with your finger and sprinkle the seeds in. Depending upon the size of the seed and the fineness of the soil, you may have to do a bit of preparation. For example, a coarse soil may have spaces too large for carrot seeds. This is easily remedied by firming the soil in the bottom of the furrow with the side of the hand or by sprinkling some potting soil to fill in the spaces. You then sprinkle your seed in and cover it with soil from the garden or more potting soil.

One challenge of direct seeding in summer, especially of shallow planted seed, is keeping it moist during germination. Forgetting to water for a day, or even half a day can kill the tiny germinating seeds. Sometimes in the summer, I cover the seeds with a blend of soil from the garden, peat moss and vermiculite. This helps retain moisture.

One of the most fun parts about direct seeding is that you can carry fast maturing veggie seeds such as radishes and Tom Thumb lettuce in your pocket as you prowl your garden. If you spot a little bare ground in a garden bed, you can swoop in and plant a micro-plot in a few seconds.

Feeding Your Plants

Once your transplants are safely in the ground, or your seeds have sprouted on site, they can seek out nutrients from the garden soil. But you'll still want to give them regular feedings for best performance. There are many options when it comes to supplemental feeding. The easiest, and the one I recommend the first time around, is simply to buy a box of balanced, organic vegetable food from the garden centre. The advantages are that it contains the major nutrients plus trace minerals, and it tells you how much to use. So there is no guesswork. For a small garden, it's perfect. As your garden expands, there are better options for feeding larger areas such as blending your own, spreading composted manure, and planting cover crops.

Fertilizer or Amendment?

Fertilizer means something that provides nutrients to plants, feeding the plants. Amendment means material added to enhance the physical qualities or microbial activities of the soil, feeding the soil. The two definitions are based more on intent than content because some fertilizers can improve the soil while some amendments also provide nutrients to plants.

Plant Nutrients

On fertilizer bags and boxes, you'll see three numbers such as: 2-8-10. These refer to the percentage of nitrogen (N), potassium (P), and phosphorus (K) in the fertilizer. This is called the NPK analysis. Most organic plant food blends are in the low to mid single digits, such as 3-4-3. If you've had a soil test done on your soil, you'll have an idea of what nutrients, if any, are lacking, and you can fertilize accordingly. Otherwise, in most cases, a general fertilizer works fine. Also important are trace minerals, which, as the name implies, are needed in much smaller quantities, but are important for the overall health of the plants and soil.

Organic Materials

Here we use "organic" to mean carbon-based. We're talking composted animal manures and composted plant materials such as straw, yard and garden waste, and leaves. While composts contain wildly varying amounts of nutrients, depending upon what they are made of, they are mostly excellent for improving soil structure. Again, generally speaking, the more plant materials the compost contains, especially dry plant material such as straw, the more it will contribute to soil structure. Some composts, such as composted chicken manure, while loaded with nutrients, do little for the soil structure.



Major Nutrients

Nitrogen (N) For green growth and in compost piles to speed decomposition.

Phosphorus (P) For root growth, disease resistance and fruit, vegetable and flower production.

Potassium (K) For strong stems, vigorous roots and increased disease resistance.

Calcium (Ca) For cell manufacture and growth.

Magnesium (Mg) For chlorophyll molecules in the cells of green leaves.

Sulphur (S) For acting with nitrogen in making new protoplasm for plant cells.

Trace Elements or Micronutrients

Iron (Fe) For chlorophyll formation; constituent of various enzymes and proteins.

Manganese (Mn) For the synthesis of chlorophyll and several vitamins; carbohydrate and nitrogen metabolism.

Zinc (Zn) For the formation of growth hormones; protein synthesis; seed and grain production and maturation.

Copper (Cu) For catalyzing enzyme and chlorophyll synthesis; for plant respiration; for carbohydrate and protein metabolism.

Boron (B) For protein synthesis; for starch and sugar transport; root development; fruit and seed formation; water uptake and transport.

Molybdenum (Mo) For catalyzing symbiotic nitrogen fixation and protein synthesis.

Cobalt (Co) For catalyzing symbiotic nitrogen fixation.

Pests and Disease

There is an ideal in organic circles, that if everything in your garden (or farm) is perfectly balanced, with good soil and plenty of nutrients, and the right amount of water, even a few pests strolling around nibbling here and there won't cause any big problems. For the most part this is true. Yet, things do happen despite our best efforts. That 's why you need to be ready and act as soon as you notice something different.

The first, best, easiest, and least costly thing you can do is getting to know your garden. Pay attention to your plants at all stages of growth. Note what they look like when they sprout and as they grow. Check out the size, shape and colour of their leaves. Get to know your weeds, too. They can tell you a lot about your soil since many weeds specialise in specific soils with specific nutrients. Check out the critters walking and flying around your garden. Some of these little beings can make or break you if they get out of control.

Look at your garden every day. You want to burn an image of it in your mind. Of course, it will change gradually. Plants grow, produce flowers and make fruit. Yet through active, daily observation, you will notice that slight change of colour or hole in a leaf or that funny little moth that keeps landing on the undersides of leaves (what's it doing under there, laying eggs?). You will notice a young plant that has been felled by a tiny lumberjack in the night or a group of cool looking striped beetles loitering on your squash blossoms.

The faster you notice something different, the sooner you can figure out what caused it and whether or not it is or could become a problem. Then you can decide what to do about it. You'll need to determine whether a pest or a disease causes the problem. This is not always easy. Some insect pests are so tiny that you can't see them and you might think your problem is a plant disease. The subject is vast, but more often than not, you'll find that your problems are caused by insects large enough to see or by diseases caused by nutrient imbalance or deficiency (whose symptoms appear in the leaves or fruit of the plant).

Controls and Strategies

Pest and disease control begin with prevention of the conditions that allow them to develop. In extreme situations, they include the use of products to combat the pests and diseases after they have begun doing damage.

Cultural Controls

This begins with soil building, nutrition and proper watering. Ideal conditions make for healthier, stronger plants. Choosing appropriate plant varieties helps. Some varieties of, say tomatoes, have been bred for disease resistance. Intercropping, or polyculture (to use a Permaculture term), means interplanting crops amongst each other. You can place repellent plants amongst susceptible plants. Also, by not planting blocks of single vegetables, it is more difficult for specialised pests, such as cabbage moths, to sniff out their target.

Logical controls include crop rotation, that is, not planting the same thing in the same place year after year. This can unbalance the soil and eventually cause disease in the plants and soil.

As strange as it may seem, another logical control is to provide an alternate source of food or shelter for the pest. More often than not, a pest will only be dangerous for a short period, such as when a crop is small. Luring the pest away until the crop is bigger might just get you through the danger period. A similar idea is planting trap crops, plants that appeal to pests, in an area away from the garden. One handy method of trapping pests that prefer staying on the ground is to place loosely rolled newspapers around the garden. The bugs will crawl into them for shelter, usually toward dawn. Leave the rolls for a couple of days so word gets around about the great new hotel. Then remove and dispose of them. If the weather is hot and dry, lightly moistened paper will help attract them even more.

Clean cultivation, or keeping a clean garden, is important to overall cultural practises. This means removing and composting dead plant materials, and disposing of diseased plant material.

Timed planting is another method. Some pests are linked to certain seasons and conditions. By knowing what pests thrive at certain times, you can wait

Physical Controls

Sometimes it's not possible to wait until later, especially for market gardeners and farmers. An early season demand for greens means they need to have early season greens. In this case, you might resort to physical control of pests.

Handpicking of pests can be very effective if the pests are big enough to be picked and the area is small enough to be hand picked. I've had the dubious honour of handpicking a few pests in my time. One year, I was an apprentice on an organic family farm in New Hampshire. One day the tomato patch looked as though it was a little more airy than on the previous day. cursory inspection revealed no clues. But closer inspection brought us nose to nose with a posse of tomato hornworms. They were big too. So four of us stopped what we were doing and fetched some pails. We systematically hand picked an entire half-acre patch of pretty big (it was July) tomato plants. We did it again for the next few days, with diminishing returns each day. Then we gave the plants a foliar feeding of manure tea. A week later, the patch was well on its way. After that, we kept an eye out for hornworms whenever we were working in the tomatoes. We never completely eliminated them, but we controlled them effectively.

Just last year, I had about 50 squash and melon plants. Or should I say the cucumber beetles had them. Both striped and spotted cucumber beetles. They found the flowers of both melons and squash irresistible. Part of the problem was that I bought the plants at a garden center and they were root bound and craving nutrients. After I planted them, we had some hot weather and they got stressed. Not the best start. Many pests specialize in locating their favourite plants in stress. It must make them taste better. So my modus operandi for the next ten days or so was to go out early in the morning and hand water each plant and hand pick the beetles. I noticed that my timing was important. Before the dew had dried off the plants, the beetles would merely do a passive roll off the leaf and fall to the ground. After the dew had dried, they would spot me and fly away when I was about two feet from the plant. My strategy evolved to include spraying them with a nozzle from three feet away.

This knocked them off the plant into the water well around each plant. I could then fill the well with water (thus performing my watering chore) and float the little beetles into harm's way, crushing them between my thumb and finger while the well was filling (thus completing my pest control task). I managed to control them in this manner until the vines started growing vigorously. I never got rid of them, not even close. But we had all the melons we could eat, and we are still eating plenty of butternut and acorn squash each week. Of course, had I been paying attention to my own companion planting advice I would have planted radishes around the young plants to deter the striped cucumber beetles!

Sometimes physical barriers such as row cover are necessary. You can't hand pick flea beetles. Too small and fast. Row cover is a synthetic material that you can cover the plants with that allows light and water through, but not bugs. Usually you put lightweight wire hoops across your garden bed. Then you put the row cover over the hoops and bury or weigh down the edges. It forms a tunnel under which the plants are protected. It is also slightly warmer inside, an added bonus. A lot of organic growers fret about the use of synthetics in their operations. It doesn't really jive with their principles. Yet small-scale farming is difficult and its use does provide an advantage. Each person must decide for himself or herself.

Traps are also used to control pests physically. Sticky traps and pheromone traps lure pests and then catch them in sticky goo. Codling moth can be controlled by cutting open plastic gallon jugs and filling them with equal parts water, molasses and cider vinegar. You hang the jug from the fruit trees and the moths fly in, attracted by the sweet and sour concoction.

Biological Controls

Introducing predatory and parasitic insects can control some pests. You can actually mail order insects that prey on pest insects. This includes parasitic insects that lay their eggs on the host (i.e. the pests in your garden) and subsequently devour the host when they hatch. It is also possible to control some pests and diseases using bacteria, spores or mycelium that are sprayed or sprinkled on the crops. The ensuing battles take place on the microscopic level. Check out the section on Beneficial Insects to read how you can attract predatory insects to protect your garden.

Sprays And Dusts

These can be divided into those that repel, such as garlic and water based solutions, and those that kill, including insecticidal soap, dormant oil, and plant based oils such as neem. Though these and other products are natural products and allowed under the USDA Organic Rules, they are still potent compounds and should be handled and applied according to the instructions on the label.

Homemade Preparations

I've seen and used many homemade sprays, usually containing garlic, hot chilli powder, and any number of other "secret weapons." Many of them do work well. I once rid a landscaping client's garden of raccoons that were ravaging her small lawn in search of worms. I stretched a piece of plastic netting over the area and secured the edges. Then I sprinkled hot chilli powder (the hottest and cheapest I could get at the Mexican market) over the area. I left the bag there for the client to apply doses daily. The raccoons left in search of easier and less piquant pickings.

Insecticidal Soap

Non-detergent soaps mixed with water break down the cellular membranes of the insects. Commercial products, such as Safer's soap, are available in garden centres. For homemade solutions, mix three heaped tablespoons soap per one gallon of water. First test it on a few leaves to make sure it's not harmful to the plant. Dilute it if it seems too strong. Or change brands of soap. For insecticidal soaps to be effective, you must spray the undersides of leaves also.

Dormant Oil

This is inert oil, mixed with water, and sprayed on trees when they are dormant. The oil coats disease spores and insect eggs with a thin layer of oil that suffocates them. It is mainly used on fruit trees. It is available at garden centres.

Neem Oil

Extracted from the Indian Neem tree, it works as an antifeedant on insects, causing them to lose their appetite.

Diatomaceous Earth

This is dust of fossilized diatoms, tiny sea creatures that lived millions of years ago. When milled their dust has microscopic razor sharp edges that pierce the shells and skins of insects, causing them to dehydrate and die. Eating it causes a similar internal reaction. It is not harmful to warm-blooded animals, but do wear a mask when applying it.

Pyrethrum

This is a powerful insecticide made from the pyrethrum flower. It kills many insects, both good and bad, so it should be used with care. It is more effective on adult populations than larvae.

Rotenone

This is an insecticide derived from tropical plants and sold under various brand names. It is harmless to warm-blooded animals but can kill beneficial insects and fish. It has little residual effect and a protection period of 3-7 days.

Ryania

An insecticide derived from the ryania shrub of South America, it is mildly alkaline and works by making insects ill. It is safe to warm-blooded animals and humans. It is not persistent. It is only available in the US as an ingredient in Triple-Plus, which also contains rotenone and pyrethrum.

Sabadilla

A powerful insecticide made from the seeds of the Central and South American plant. Effective against many insects (including honeybees, so be careful), it does not persist after application.

The Pest Posse

Mammals

This group can include the underground group (gophers, moles, and voles) as well as the terrestrial group (mice, rats, rabbits, dogs, raccoons, deer, bears and probably several others I haven't thought of). For the underground pests, the options are trapping and exclusion. Exclusion only works for small gardens because it involves burying wire fencing. One method is to set up a garden bed with a wooden frame. Then dig out all of the dirt and lay chicken wire (smallest holes possible) or hardware cloth in the hole and staple or nail the edges to the wooden frame. Then return the dirt to the hole. Eventually, the wire will rust in the ground. Another way is to erect a fence around the garden. After the fencing is attached, dig a ditch around the perimeter and extend the fence downwards with hardware cloth and upwards to meet the garden fence. You can even extend it up higher, say one foot or so, to exclude rabbits, mice and rats. A good eight-foot fence will keep out deer, but if a bear decides to visit (most likely fruit trees in late summer and fall) you're probably out of luck.

The other option is trapping. Gopher traps are cheap and work well if you are persistent in monitoring them. You can also get live traps to catch small mammals and release them somewhere else.

Birds

Birds can be a big hassle right after you've sowed a bunch of seeds. It's a pitiful sight to watch a gang of crows steal the seed from a newly planted corn patch. For a small garden though, it's easy to deal with. Using row cover to protect the seeds works well. If birds, especially ducks and geese, are stealing seedlings, a two-foot wire fence around the garden will stop them. Another strategy is to start the seeds in containers and hold them until they're bigger before planting.

Insects

This list is simply too huge to go into. However, I must admit that I've had more good luck than bad, and I believe it's distinctly related to constantly improving the health of the soil and making sure the plants are healthy. Insects tend to favour weaker and unhealthy plants because they have more carbohydrates and are sweeter.

Snails And Slugs

These guys get a bad rap and rightly so. The absolute most effective way I've found to control them is to develop a taste for escargot (that's French for snails). No kidding. They can trash your garden but they sure are tasty. The first step is hand picking them. Go out very early on a dewy morning and you'll see them hanging around the garden and heading home for cover. They like shady, dark places. You can even put boards or pieces of cardboard in and around your garden for them to hide under. Then you just go out, lift the boards, and voila! You've got appetizers for next Friday night. It's really quite easy to knock back the snail population by picking them for a few mornings.

Slugs are a different situation because many of them are tiny and they can hide anywhere. They do have a weakness, though. Beer! Slugs love flat beer. You can put out little trays of flat beer in the garden and slugs will come and drown themselves in it.

Other control methods for snails and slugs include a border of sand, lime or ashes around the garden. They also dislike crossing wood shavings and oak leaves. A more costly solution is to nail a copper strip, available at garden centres, completely around your wooden garden bed frame.

Weed Control

There are two basic ways to control weeds, physically and chemically. In a small organic garden, I have never controlled weeds with chemicals. I see no need for it. The task can be accomplished using hand tools. If done at the right time, weed control can be quite easy.

Cultivation

Cultivation is the shallow disturbance of the soil with a tool. The idea is to prevent recently sprouted weeds from becoming established. With hand tools, you can cultivate a small garden by lightly disturbing the top layer of soil and basically knocking over and uprooting weed seedlings. With proper timing, cultivation eliminates the need for weeding.

Cultivating around spots where you have direct-seeded is a little tricky. First, it's a good idea to mark the ends of the direct seeded rows with sticks or stakes. Second, you should know what your vegetable seedlings look like so you don't pull them out accidentally. If you have big, nubby fingers or if the weed and veggie seedlings are too close together, a pair of tweezers works fine.

Weeding

Everyone has heard the old saying that a weed is merely a plant growing where you don't want it to grow. A plant in your garden bed may be a "weed" while the same plant growing in a field isn't. Being the steward of your garden, you get to decide what stays and what goes.

If the weeds become too large to cultivate out of existence, then weed you must, getting out to the garden and pulling the weeds by hand or with a cultivating hoe. The bigger the weeds get, the more work it is. Plus you can lose precious soil when you have to pull up grass clumps and other weeds with thick, tenacious root systems.

If you end up having to weed, don't feel too bad. Scarcely a farmer or gardener exists that doesn't fall behind sometime in summer when all plants suddenly explode with growth. One of the crazy aspects of weeding is the pulling out of plants that seem to grow faster and better than the plants you want to grow. The funny thing is that some of the weeds are quite nutritious and may actually be worth leaving in. It's worth getting to know some of the weeds, such as pigweed, lambsquarter and purslane, and use them in salads. Contrarily, there are some weeds that are horrific and noxious and should be mercilessly eliminated from the garden.

Cultivation Tools

There are a number of cultivation tools available at garden centres. My favourite "on the knees" tool looks like a miniature hoe blade with a metal stem attached to a handle. It's good for cultivating around established plants in small spaces.

For "stand up" cultivation, a cultivating hoe works well. Don't use one of those terrible general-purpose hoes. A cultivation hoe has a thin, narrow blade that sits at a 70 degree angle to the handle. It is made so you can pull in cleanly through the very top layer of soil from an upright position, not stooped over. It is important to keep the edge sharp. Pick up a file when you buy your hoe and ask someone to teach you how to sharpen it.

Composting

Composting counts as one of my favourite gardening activities. I love the idea of collecting all sorts of plant materials and harnessing natural forces to create something that is so wonderful. Compost has two important functions: to improve soil structure and to provide nutrients for plant growth. Its humic acid also makes the nutrients more available to the plants.

Composting is easy and can be done on any scale. Years ago, I lived in an industrial neighbourhood in a Spanish city. We had a tile patio in front of our row house. I wanted a garden badly, so I collected some boards and made a bed about 6 feet (1.8 m) by 8 feet (2.4 m) and about 18 inches (45 cm) deep. I drove into the hills outside the city and collected some sacks of not very good soil and filled the bed. It took several trips. I found a source of rabbit manure so I fertilized with that. Yet there was not much life in the soil. One night (the night before trash day) whilst walking home, I encountered a terracotta pot full of rock hard soil. The next day I dumped it out and broke it up. In the bottom were two earthworms, dormant, encased in rock hard soil, each tied into a little knot. I put them into my garden. Within a month, the soil was teeming with earthworms.

I made a little compost pile in one corner of the garden, about 18 inches (40 cm) by 18 inches. It was like a little pit, so when the layers built up it was even with the soil surface. I layered kitchen waste (except meat and bones) with soil. The earthworms moved in. The insect and microbial populations increased. A gecko even moved into the wooden crate that I used as a lid for the pile. It wasn't long before my urban patch was teeming with herbs and chilli peppers. The old ladies in the neighbourhood would even slip through our gate to steal my hot peppers, which I considered a compliment.



Making Compost

When you build a compost pile, you're inviting thousands, if not millions, of creatures to dinner. They, along with the heat of decomposition, turn a pile layered with dry vegetation, green vegetable and kitchen waste and soil into a rich, crumbly material that will do wonders for your garden.

You can build your pile on the ground or you can build a frame for it. You can even buy handy plastic containers to make compost in. Most books recommend a minimum pile size of 3 feet (.9 m) by 3 feet (.9 m) for best decomposition, yet my little story demonstrates that a tiny compost pile works just fine.

The recipe is roughly 1/3 dry vegetation, 1/3 green vegetation, and 1/3 soil. The dry vegetation (twigs, small branches, straw, any plant material) provides carbon, which, along with the soil, will provide the bulk of the compost. Don't use pine needles or lots of dry leaves, as they are too acidic.

Carbon needs nitrogen to decompose. The green vegetation and kitchen waste provide nitrogen, the fuel to get the compost pile warmed up. You can get green vegetation from lawn and garden clippings.

The soil provides bulk to the pile and also contains bacteria, microbes and tiny insects that will "inoculate" and help digest the plant materials.

It's nice to build a pile at once if you have enough materials. But building as you go works fine. To get enough kitchen waste to make a layer, you may need to collect it in a lidded container for a number of days. Put everything (even tea bags and coffee grounds) except meat and a lot of oily stuff in it. When you empty the container, it will probably smell fermented. Don't worry about it. Just pour it on the pile and spread it out.

I've found that the best order for layers is dry first, then green, then soil. The dry soaks up the juices from the green and the soil covers the kitchen waste so that neighbourhood cats and birds won't start hanging around. The layers should be about 1-2 inches (2.5-5.0 cm) thick for dry materials, about 1 inch thick for green materials, and one-quarter to one-half inch (.62-1.2 cm) thick for soil. Most importantly, don't overdo it with the green and kitchen material.

These contain the nitrogen that will heat pile and aid decomposition. Too much heat, about 150F (65C), will kill or drive away the beneficial creatures.

Worm Boxes

Another excellent way to turn your green waste into “brown gold” is to invest in a worm box. You see, worms have an enormous appetite and can digest lettuce, coffee grounds, and other food scraps and turn them into rich “castings,” a nice term for their faeces. They are quite easy to care for, provided you follow the directions that come with the kits. Even if you live in a flat or apartment with no outdoor space at all, worm tanks are a fantastic method to capture the nutrients and energy of food scraps rather than lose them to the municipal waste heap. One more added bonus is that children (and some adults!) find them fascinating. Worms are an introduction to recycling and gardening.

Materials Not To Compost

Some materials are not suitable for the compost pile. They include: diseased plants or plants suffering from severe insect attack as they may harbour eggs, poisonous plants (oleander, hemlock, castor bean, poinsettia), acidic or toxic leaves such as eucalyptus, walnut, and pine needles, ivy and succulent plants which may survive the compost pile and sprout in the garden, weed seeds and weeds such as Bermuda grass and morning glory, cat and dog manures (they contain potentially harmful pathogens that survive composting).

Animal Manures

Composted animal manures are great for the compost pile if you can get them. I understand that rabbit and llama are the best, followed by cow, sheep and horse. Chicken manure is very high in nitrogen and should be used sparingly. In the city, you’ll just buy whatever organic manure in bags that you can get. But in the country, there is greater access to manure. Beware of farms or stables that spray for flies, as the residue will be on the manure from the stalls or barnyard. Likewise, the manure could be mixed with bedding materials such as sawdust or wood shavings. This provides too much carbon so use it lightly.

Applying Compost

In my experience, there is never enough compost to go around. So I spread it judiciously, about 1 inch (2.5 cm) thick on the surface of the garden bed. I like to spread it on the surface and not mix it in much, imagining that watering will carry the nutrients gradually down to the roots. Sometimes when I am setting out plants with a lot of space between them (such as tomatoes, cabbage, peppers, melons) I plant first, then spread some compost around the plant, cultivating it lightly. Although their roots will extend far beyond the plant and utilize compost anywhere in the bed, this is simply a way to economize when there's more ground to cover than compost to cover it.

Soil Building

Soil building encompasses much more than just adding fertilizers and compost. It encompasses a philosophical point of view as well. Soil building goes beyond mere organics and into the realm of true sustainability. We can buy and use certified organic fertilisers, yet they come from afar and require a huge infrastructure of processing plants, vehicles, fuel refineries, etc., to arrive at our doorstep. When we begin to compost materials obtained from our home or nearby, we begin to recycle energy, much of which the plants obtained by “eating sunlight”, capturing free energy through photosynthesis and turning it into physical matter, that is, roots, stems and leaves.

Soil is teeming with thousands of species of tiny creatures. They eat nutrients in the soil and sometimes each other. Their tiny carcasses and waste decay and improve soil structure. Some of them interact with plant roots and make the plants grow better. In turn, the roots grow, die, and decompose in the soil, also adding to its quality and structure. Eventually, the soil becomes richer and looser. It allows air, insects and water plenty of room to move about and do their thing. By composting and building the soil with materials right at our fingertips, we are keeping energy and nutrient cycles close to home, capturing massive amounts of energy and reducing waste, all the while growing fantastic fruits and vegetables in our organic garden.

Companion and Attractor Plants

This is one of the most exciting aspects of gardening, where gardening as craft becomes gardening as art, and we get to use nature's abundance as our palette. On the most fundamental level we can consider companion planting, where one type of vegetable has a beneficial effect on another, or they are mutually beneficial.

This is usually achieved through root secretions or odour.

Some plants secrete chemical compounds from their roots that drive pests away, such as the marigold. Other plants have a scent that may be strong enough to confuse predators of a different plant, such as leeks against the carrot fly. Expanding this concept, we can consider plants that may not have a direct effect on others, but may attract beneficial insects, or possibly be used as decoys to lure pests away from the fruits and vegetables of other plants or trees.

Companion planting need not be limited to specific effects of one plant on another. The benefit may be time or space related. When you plant a row of lettuce seedlings, there is lots of bare ground around them. Plant a row of radishes in the bare space and they will be ready for harvest just about the time the lettuce is ready to overcome them. In addition, earth flies love radishes but flee at the scent of lettuce.

Expanding the concept of companion planting, we can consider plant “guilds”, groups of plant species that, overall, achieve a positive effect by growing near each other. The classic vegetable guild, The Three Sisters, from the Native American gardening tradition, includes corn, squash and beans. The corn is planted first. After it has sprouted, a bean is planted next to each stalk. Every so often within the patch, squash is planted. The corn provides a pole for the beans. The beans’ roots are able to “fix” nitrogen in the soil, which is good because corn is a heavy nitrogen feeder. Squash is a light nitrogen feeder and its leaves shade the ground, thus helping conserve soil moisture.

Attractor plants attract beneficial insects. The most famous attractor plant family is Umbelliferae, commonly referred to as umbelliferous plants. They include carrots, parsley, celery, angelica, lovage, parsnip, chervil, and cilantro. What makes these plants so cool is their flower structure, which looks like an umbrella. Notice the similarity of the words? Their flower umbrellas are composed of dozens of tiny white to creamy white flowers borne upon thin stems. Not only do insects like the flowers, they make great landing strips for all sorts of flying insects that pollinate and prey upon harmful insects. Attractor plants need to flower for maximum benefit. Some other plants that attract beneficial insects are Garlic mustard (*Alliaria petiolara*), Borage (*Botago officinalis*), Butterfly bush (*Buddleia davidii*), Buckwheat (*Fagopyrum esculentum*), Lemon balm (*Melissa officinalis*), Devil’s bit scabious (*Succisa pratensis*), New Zealand spinach (*Tetragonia tetragonioides*), Nettles (*Urtica dioica*).

Twelve Great Companion Planting Combinations

1. Basil and Tomatoes Basil planted with tomatoes improves the tomato's flavour and growth. Be sure to plant the basil far enough away so the tomato plant doesn't swallow it.

2. Bush Beans and Potatoes The beans protect the potatoes from Colorado potato beetle and the potatoes protect the beans from Mexican bean beetle.

3. Beets and Kohlrabi They both have the same cultural requirements yet they take their nutrients from different levels in the soil.

4. Cabbage Family and Aromatics Cabbage, broccoli, cauliflower, kale, and collards do well with celery, dill, chamomile, sage, peppermint, rosemary and onions. Interestingly, the aromatics have flowers that attract beneficial insects to ward off cabbage moths.

5. Lettuce and Friends Lettuce grow quite well with strawberries, cucumbers, carrots and radishes.

6. Lovage In The Garden Lovage planted here and there throughout the garden improves the health and flavour of other plants. As a seasoning, it helps reduce the amount of salt needed in a dish.

7. Nasturtiums and Friends Planted with squash, they help repel squash bugs. They also deter aphids to the benefit of the cabbage family, radishes, potatoes, and cucumbers.

8. Onions and Friends All members of the Allium genus (onion, leek, garlic, chive, perennial onions) planted throughout the garden are helpful to cabbages, beets, strawberries, tomatoes, lettuce, summer savory and chamomile.

9. Parsley and Carrots Directly sowed together, the parsley helps repel the carrot fly by masking the plant's aroma.

10. Peas and Friends Peas do well with carrots, turnips, radishes, cucumbers, corn, beans, and potatoes. Planting peas with an inoculant (from a garden centre) will improve their vigor.

11. Radishes and Friends Sown with cucumbers, squash and melons, they help repel striped cucumber beetles early on. They are also helpful to sow with beetroot, spinach, carrots and parsnips to mark the rows of those slower germinating crops.

12. Valerian and Friends Valerian is good anywhere in the garden as it gives vegetables added vigor. It is rich in phosphorus and earthworms like it, so it's a good addition to the compost pile. Tea from the dried roots is also a relaxing sedative.

Beneficial Insects

I'm going to cheat here and start by discussing not insects, but fungi, beneficial fungi called mycorrhizae to be precise. They live in the soil and interact with the tiniest roots, converting insoluble nutrients such as phosphorus into usable forms. They, in turn, receive carbohydrates from their hosts. You can buy mycorrhizae in powder form and sprinkle it in your garden.

The Praying Mantis looks frightening but is really a great garden ally. It eats all sorts of insects, including good ones, but is considered to be more helpful than harmful. Mantis eggs can be ordered through supply houses. Not scary at all are everyone's favourites, the ladybirds. Both the larvae and adults devour pest eggs and adults. They most famously eliminate aphids, those destructive sap sucking insects, though they depart quickly once the aphid population has been devoured.

Numerous species of wasps are parasites as well as predators of pests. These include Braconid wasps, Chalcid wasps and Ichneumon wasps. Insect experts, a.k.a. entomologists, believe that host-specific predators and parasites are more effective at reducing pest levels than mantis' or ladybirds.

Flowers in the Garden

No garden should be without flowers. Many people segregate their vegetable gardens from their flower gardens, but I consider this a sad state of affairs. Not only do flowers beautify, they are very practical for many purposes.

The first and most obvious benefit of flowers is their beauty, and sometimes their scent. Their bursts of colour in a bustling summer garden are undeniably uplifting. You can cut a nice bouquet for your table while you harvest dinner to be served on the same table. Foxgloves, Calendulas, Zinnias, and dozens of others can be tucked here and there in the garden.

Then there are the practical benefits. Marigolds (*Tagetes* species) planted throughout the garden help repel nematodes, tiny pests that live in the soil. The marigold's roots exude a substance that lasts up to three years. So after the first year, they will provide ongoing benefits. Plus they are a handsome flower in their own right. Scarlet sage and Dahlias also discourage nematodes.

Usually after they've gone to seed, certain flowers attract birds. The mighty sunflower comes to mind. Planting a few seeds at the corners of the garden never fails to impress come summer, whether they be the giant flower types or the smaller ones of vivid yellows and oranges. And don't forget that the flowering attractor plants are handsome in their own right, and they provide forage for birds when their seed has matured.

Kids' Gardens

Both of my children have been gardening with us since they were infants. My daughter's first harvest was a mud pie that she consumed happily. She later went on, at the mature age of seven, to organize and teach a gardening class to three and four year olds. Much of this section is gleaned from watching that class over its six week (one session per week) run. I've thrown in a few ideas of my own as well. Much of the same thought and preparation goes into a kid's garden, though the adults should deal with the boring details behind the scenes. Since a child's sense of time is magically different from an adult's, we should also consider this when including wee ones in the activities. They won't want to hang around and dig a new garden bed from start to finish but they'll certainly want to give it a try. After that, while you do the hard work, find a task suitable to their age (even if it's not really valuable or productive) that will give them a sense of participation and importance. Ask them to sift through the soil and remove rocks or break up dirt clods with a little hammer.

Intention

A challenge when gardening with children is trying not to project our adult minds onto their reality. Their gardening desires can be broken into four activities: putting stuff in, planting seeds and starts, watering, and harvesting. I try to keep things light in the garden, meaning that I don't moralize or explain too much. My intention is to provide an enjoyable venue for an experience through time and space, which is what gardening is. I provide a basic framework, a point of departure, for the child. Different kids will be drawn to different things. Some kids will get into the insects. Some will be fanatical seed planters. Others will fall for flowers. Let them experience gardening on their own terms and see where it leads them.

Choosing A Kid's Plot

Find a spot in the garden that can be the kid's personal garden. Let them rule this domain no matter how fanatical or irrational they seem to be regarding their plot. Well, perhaps you would do well to impose certain limitations in extreme circumstances such as when they want to fertilize three times a day, every day! Or if the spot has turned to swamp land from over watering. If you frame the garden's plight in human terms, they usually get it, as in "giving them too much fertiliser, Johnny, would be like if I made you eat two truckloads of spaghetti every day."

Putting Stuff In

Most kids seem to love combining ingredients and mixing them up. They will enjoy adding fertiliser and compost to their plot. For fertilisers such as plant foods, bone meal, blood meal, minerals, it's best to measure them out first then allow the kid to sprinkle it out. If they insist on pouring from the box into their container, make sure to do it over a tray so you don't lose any to the ground. From a pile or a bag, have them fill a kid-size bucket with compost, dump it on their plot and spread it out. A bucket from the toy shop works perfectly. If the child shows any real interest in gardening, do them a favour and buy real wood and metal hand tools. The plastic toy tools simply don't work in real soil and have only one legitimate place: the sandpit.

Planting Seeds and Starts

Boy, do kids love planting seeds. Have you ever seen a 2-foot by 2-foot (61 cm x 61 cm) plot planted to 26 beans, 7 pumpkins and 11 sunflowers? What a sight! It's always a good idea to start the seed planting exercise with some words about how the seeds are going to become big plants and will need plenty of space. But be forewarned that your words will likely go unheeded. Planting seeds is just too much fun. It's perhaps one of the greatest acts of faith known to humanity, so who are we to stop a kid from planting, even if, from our rational perspective, it's a disaster in the making. Let it go. Believe me. To the kid it will be a great tangled, spindly, gangly success. Savour the moments.

Big seeds and fast-growing seeds work best for a kid's garden. Big seeds are easier for their little hands to hold and they are more fun to look at. Beans and corn especially, come in a vast array of colours. At the garden centre, they will be attracted to the prettiest pictures on the packages. Fast-growing seeds are essential for quick returns.

Buying or growing starts can speed up the process. A combination of seeds and starts works nicely. You'll have some instant results from the start and something to look forward to from the seeds. And don't forget to include flowers in the garden.

Watering

Kids love watering. But they like to water in a way that can challenge their garden, especially in its early stages. Basically, a kid will stand with a hose and inundate their plot with torrents of water. So it's up to us to mitigate. Luckily it's not that difficult. There are many nozzle attachments available in the shops. They all do the same thing, with varying degrees of success: they moderate flow rate and water particle size. Since kids are notorious for watering the same spot for extended periods, the ideal nozzle would have a reduced flow with small particles, perhaps a mist. Consider, also, the nozzle's construction. Plastic is breakable. Metal is better. If you force a kid to do anything in the garden, let it be that they learn to set the nozzle down rather than drop or toss it.

Kids also love watering cans with spouts. Choose one they can carry and pour without much strain such as a half-gallon size. One gallon of water weighs over eight pounds, too heavy for a child. A reasonable sized can for kids is not terribly practical for watering. But the upside is that kids can keep busy for hours, filling their can from the hose and ferrying it to the garden, a much nicer option than watching television or playing computer games.

Harvesting

Who doesn't love to harvest fruits and vegetables? Kids are extremely proud harvesters. From the first radish to cucumbers and flowers, they gather the fruits of their labour with intensity, sometimes returning several times a day to see if there is something else ready to pick. By this time there's not much else to do except enjoy. It does help to encourage waiting until the crop is ripe before picking.

Seed Saving

Sometimes a vegetable will escape notice and grow too big to eat. Cucumbers and beans are notorious. This is a perfect opportunity to do a little seed saving and introduce the circular concept of gardening to your child, going from seed to seed. If they show interest, include them in seed saving activities in the adult garden as well.

Your Harvest

Your produce should be perfectly ripe when harvested. Immature or overripe produce has lower quality and impaired storage potential. Non-edible portions such as carrot tops or outer leaves on cabbage should be removed. You see, vegetable plants "breathe" when they are alive, and they continue to "breathe" after they are picked, which means they lose moisture. Reducing their surface area where possible helps slow this process. Harvest in the morning before the produce has warmed up. If you have to harvest later, cool the produce in cold water, then drain and store it in a cool place or the refrigerator.

Storage

Most produce can be stored together. But there are some combinations to be avoided. Apples, pears, peaches, plums, cantaloupes and tomatoes give off ethylene gas as they ripen. Produce damaged by ethylene includes lettuce, carrots, greens, celery, cabbage, potatoes, and onions. Many products pick up odours when stored near onions, so find a separate spot for them.

In Closing

This has been a wonderful guide to write. It has stirred up years of memories of all my (and my wife's) gardens around the world. At each step I asked myself, "What would I have loved to know about this when I was starting out?" With other gardening books running into the thousands of pages, this guide does not attempt to compete. It simply gives the aspiring organic gardener a soft introduction into what I hope will become FOR YOU a lifelong vocation.

TO YOUR ORGANIC GARDENING SUCCESS!

