

GROWING EMPOWERED

By
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A Pathway to Food
Security, Self-Reliance &
Creating an Awareness of
the Symbiotic
Relationship between Us,
All Life & the Earth.

This book could not have been made possible
without the encouragement and support of
many.

Thank you for believing that we can make a
difference in this world.

Introduction

My first experience in a garden that I can remember happened when I was a small girl playing in the family garden plot that had been rented for the growing season. My mother told me she had some 'ice cream' for me. She handed me something that was cool to the touch, angular but also curved in shape and a pale peachy-yellow color. It was crunchy, sweet, and even a little bit spicy.

That day, I enjoyed my first taste of raw turnip.

I truly became interested in gardening in my twenties. I loved the idea of growing food for my family, spending a great deal less for produce in general, helping life to grow and getting my hands in the dirt. These were all things that gave me a lot of life. I became a dedicated gardener, starting with container gardening, within the space of a decent sized balcony and a little plot right off the front door of a townhouse where we lived in the city of Edmonton, Alberta, Canada in 2005. I was a full time mom and housewife, working the odd job here and there. I also applied and was accepted to the Master Composting/Recycling Course offered by the City of Edmonton which was invaluable in developing yet another area of knowledge that was crucial for ensuring nutritionally dense food.

Over time, I expanded my knowledge base and focus, which resulted in digging up the entire side of the townhouse block and planting food to share with everyone in the building. Our neighbors loved it, although sadly enough, when the rental rates in the city were dramatically increased in 2007, we relocated out to the countryside.

Nine years later, in 2016, that little strip of dirt continues to be tended by the 'gardeners in residence', which is so great to know.

By the time my family relocated to the country, I was ready for a big garden. For a good portion of the seven years that we lived Rural Alberta, I gardened between the 3' x 7' greenhouse in the basement and the 8,000 square foot (.9 of an acre) yard that we had. I spent much of the winter months reading, dabbling in this or that bit of knowledge, always expanding my awareness and understanding of everything that is green.

Eventually, the community took notice of our yard and the garden/garden projects I had created. I had many a conversation with the public, with dirt on my cheek or produce I had grown in hand or in a basket on my hip.

As time went by and with the encouragement of others, I created a beginners gardening curriculum and began teaching components of gardening that weren't well known to people. The level of knowledge and expertise of my students encompassed zero beginners, people who had been attempting to garden and running into 'roadblocks', as well as gardeners who had been playing in the dirt for more than a decade. The feedback I received was wonderful and all came away learning something new.

It was pretty awesome to be able to share my knowledge with others.

In my journey to this point, I have navigated my way through massive amounts of knowledge. People have been sharing stories and writing about plants, growing food and gardening for a very long time and I have been fortunate to discover some of these Old Ways and New methods of approaching these things. There are so many people in this world that have empowered themselves and the people around them with what they have learned and come to know through experience. Their creativity and tireless drive to share what they know has been a huge inspiration for me.

I spent a great deal of time looking back while I was learning. I still do. Human beings would not have made it to the 21st Century if they didn't know something about survival. The First Nations peoples, and the pioneering homesteaders had established ways to survive within a culture that was modernizing. First Nations peoples had been living on Turtle Island (North America) for millennia upon millennia, thriving for quite some time before the arrival of those who would colonize them. The settlers were assisted in many instances by the Indigenous peoples with survival and food security knowledge, showing them how to forage and harvest the edible plants natural to the area. Other newcomers brought their own seeds and ways of growing food to North America or devised new ways of sustaining themselves. Most survival stories of the Indigenous peoples have been passed on orally, taught first hand down through the Generations. There are a great many stories told along with written publications released bearing witness to the ingenuity and innovation demonstrated from all of these peoples and cultures here in North America

It is clear that, regardless of their culture of origin, many of those who came before us were creative with their skills and resourceful with what they had. To cooperate and exchange information increased their chances for survival. The approaches they took were often holistic, intuitive and bursting with foresight.

An awareness of the knowledge of our predecessors, regardless of their chronological distance from us has a great deal to offer in securing our future. They have so much to teach us.

We must acknowledge, process and recognize the legacy they have left behind as being intrinsically valuable to our planetary survival as a whole.

In the last century, we have seen great progress with new ideas, new technologies, processes and methodologies surrounding gardening, growing food and survival in our World.

With the dawning of the Internet, ringing in the Age of Information, much of humanity has become connected in ways we could not have imagined, empowering human beings to create entire online communities, share information in a mere second and problem solve with people on the other side of the world.

Among many other things.

I often think of the Internet as the World's largest library.

In contrast, we have also witnessed a sharp decline in the nutritional content of foods. The launch of adding chemical fertilizers, pesticides and herbicides into the soil, the introduction of genetically modified organisms, additives and preservatives into our food supply and the

industrialization of food production and food manufacturing with the creation of factory farming have completely impacted the health of the food we eat. Not one of these 'innovations' has been helpful or healthful to this world at large, nor has the world hunger crisis been solved.

The corporate assault upon the global food chain must end.

I have discovered too that much of the valuable knowledge that we once had as a human culture has largely been lost through the years.

At one time humanity decided its own future. We determined how we lived which often determined how we died. We had a great deal of control over our individual lives. We lived and died by the land, by our crops, by our herds and by our ability to find water, hunt and forage for food.

We have come so far with expanding the diversity of produce available to us in our grocery stores, but we have regressed drastically when it comes to the quality of our food and the nutritional value of what we eat, and the food that we produce ourselves. Our impact on the planet due to our disconnection from the Earth and all its life giving power has not been a positive one.

You will build upon or grow in your knowledge of how to produce healthy, nutritionally dense food, easily, quickly, cost effectively and creatively, with a holistic approach. You will become aware of more than you ever thought possible about how interconnected we are with the Natural World. You will become empowered to grow.

And this is the foundation for Growing Empowered.

You may be a zero beginner having never taken the opportunity to try out your green thumb. Or maybe you tried your hand at gardening but became so intimidated that you gave up. Or maybe you kept killing plants without rhyme or reason. Or maybe you are a seasoned gardener interested in hearing a different perspective on growing food.

I have been all of those.

There is something useful in the pages that follow for everyone.

What I share here in "Growing Empowered" is a compilation of all of the things I have learned in my journey with growing food and most of the things I have actually done myself. I think it is pointless to write about things I have not carried out on my own, prudent to share things that I have discovered that I think are important, and vital to pass along anything and everything that can tear down the barriers that exist between us and food security, us and nutritional health, us and freedom.

There are many people that have come before us sharing their knowledge and wisdom gained through their connection with nature, science, innovation and resourcefulness with the people. I am not a specialist and thus I have drawn somewhat from their writings to prevent redundancy and save myself and you some time. I will give them credit where prudent and list

them off in the back matter of this course. I have also included whatever documents I could obtain online, compiling them into a zip file for your personal use.

These writings are dedicated to the human beings on this planet, who are struggling for survival and needing freedom from the life taking, anti-human Systems that we live in.

My writings are not entirely about gardening, nor are they all about science. Nor is it purely a course on how to grow food and feed yourself or your family.

This is a course in relationships: Our relationship with food and how to give it the best nutritional value we possibly can. Our relationship with water and how valuable it is. Our relationship with ourselves and all life and the Earth upon which we live, breathe and grow our food.

More than anything, I write for this World. I write because I love the Natural World that exists here on Planet Earth. I write hoping to create remedy and relief for the many legged, the no legged, the four legged, the two legged, the winged, the water breathers. I write because it is obvious that we cannot continue on the way we are.

I write to empower the People.

No matter what part of the world you live in I am certain you have seen someone somewhere suffering due to lack of food, water, shelter. And community.

In the 21st Century, there is no reason why children are starving, families have no community and human beings are isolated and alienated from the rest through homelessness.

The knowledge contained within these pages and the accompanying zip files will help you to alleviate that.

Growing Empowered will assist you and others to change the socioeconomic landscape of where you live.

The possibility of it opening up a different world to you and your community is there...

A world of abundance. A world of collaboration. A world of ease and peace. A world of empowerment through information.

Thank you for showing up, caring and wanting to learn.

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Gardening

101

Learning to garden can be as complex or as easy as you make it. There are an infinite number of books that have been written out there about this subject. You can also find some incredibly specific titles that will expand on just one facet of gardening or even one crop of food.

But, this chapter is going to be the primer for this course. We are starting with basic knowledge here and expanding from there.

First off there are some valuable questions you need to begin thinking about:

What are your gardening goals?

Are you growing with only food in mind? Are you feeding your community or feeding your family? Are medicinal plants and pollinators a part of your plan? Are you growing year round in cold climates? Do you have any space or mobility issues? Are you looking at replenishing the soil with the intent of creating a biodiverse soil/growing environment? Are you in a temporary location or completely settled and wanting to leave a legacy for generations to come?

The answers to the above are going to alter your approach and plan while you empower yourself to grow. We will work through the answers to these questions throughout the course.

Where are you Growing? - Plant Hardiness Zones & Greenhouses

The very first thing that is good to know when you set out to plan your outdoor garden is what planting zone you live in. Plant Hardiness Zones are geographical locations that vary in temperature from region to region. The plant hardiness zones are determined by the lowest average temperature that occurs in a region. Vancouver Island on the West Coast of Canada is typically a Zone 8 region. And up in the Northwest Territories of Canada is a Zone 1-2 region. Even if you've never been to either place, you can still probably imagine the vast difference between the natural vegetation and the diversity of the vegetation that you can grow between the two.

You can easily find out what yours is by researching 'Plant Hardiness Zones' on the Internet, or contacting your local environmental office.

The reason this is important is because every plant has a temperature tolerance. If it becomes too cold over the winter season that plant will die. Some plants might not germinate (sprout) outdoors or survive the temperatures of the growing season in your climate. Other plants might not survive the winter or have enough time to grow, unless you are growing something that can complete its growth cycle from seed to table by the end of your growing season.

When you start checking out seed companies and seed catalogues, you will notice that they list the plant hardiness zone for each and every variety of seed they are selling. It will usually say something like 'Z3-5' somewhere in the description of the plant for example. I've also seen a general statement at the beginning of the catalogue explaining that all seeds were grown in and for a specific climate ie. Manitoba, Canada, Zone 2-3.

I never understood the importance of Plant Hardiness Zones until I was a few years into my journey with gardening. It took a couple of significantly epic fails before I started seriously digging in trying to figure out what I was doing wrong.

When I had a pretty good sized garden, I lived in Western Canada in a Zone 3b climate. I fell in love with a family of plants called 'rhododendrons'. I did everything I could to try and grow them over multiple seasons, following 'all the rules and instructions' I could find. To no avail. I didn't pick up on how tender they really were or just how important the Planting Zone was where I lived when it came to growing them.

I would never attempt to grow something outdoors here and now that is a tender perennial needing Zone 9 or Zone 10 temperatures for example. The likelihood of succeeding from seed to fruit isn't very high. I MIGHT be able to acclimatize other plants with a lot of effort over a long period of time which means trying to get them used to the climate by undertaking different methods of protection over the winter, but it is very doubtful for example, that an avocado plant would make it through these winters as the temperatures here are far too low for an avocado plant to strengthen itself enough to make it through. I might also try to grow plants that are listed as Zone 4 or 5 as our climate here in Alberta has been changing so much that the plants that are often listed as Zone 4 or 5 hardy are behaving like perennials and coming back every year.

The weather in Alberta can be extremely erratic, with the daytime and nighttime temperatures fluctuating with a differential of 10-15 degrees sometimes (if I remember right) in the late winter/early spring and then fall months. Many people here without a greenhouse have had to do some pretty extraordinary things in order to garden and garden well with these fringe plants that are on the cusp of acceptable temperatures for them.

If you know what zone you live in, you will know if it is even worth it or not to try growing a particular plant unless you are growing indoors. Planning and planting according to your climate is crucial to your success.

As a side note (<<< and you will see lots of these throughout "Growing Empowered"), I remember an older friend who had a tomato plant that she loved a great deal. She would overwinter this tomato plant in a pot in a cool spot in her home through the winter and then water it and fertilize it and put it back outside after she was sure the last frost had come. She kept that tomato plant for more than seven years and as far as I know, still has it.

And finally, while researching statistics for this section, I came to discover that the region where I live has jumped from a 3a/b Plant Hardiness Zone (1931) to a Zone 6 (2010). I think this means multiple things but the most important thing to me means that people who live in the region where I live can grow a wider variety of things outdoors because the climate has warmed up so much.

Perennials... Biennials... Annuals... What are those?

Perennials are plants that grow for more than three seasons, flower for a short time, produce seeds and go dormant over the winter and then repeat that cycle of growth - flower > go to seed > go into dormancy, year after year if they are grown in a climate that is suitable for them.

Plants such as chives, strawberries, grapes and rhubarb are incredibly hardy plants for example and you can rely on them in a Zone 3b climate, possibly even lower with some really decent winter protection. Perennials require very little fuss and care typically, but they need to be picked, they need to be looked after well during the three active growing seasons (spring, summer & fall) and they're root systems sometimes need to be divided in order for them to thrive.

Biennials are plants that flower in the first season, become dormant, and in the second season produce seed, after which they then die. Beets and carrots are two such plants. They require two seasons to go to seed. So if you have a great type of carrot or beet that you've grown, pick most of them to eat but leave a few to sit through the winter season so they can go to seed. You can collect these seeds for trade over the coming winter, share a new variety with your friends and family, sell them to others or save yourself some money by not having to buy more seed for the coming season.

Annuals grow from seed, flower, produce seed and then die, all in the same season. Melons, beans and peas are just some of the annuals that you can grow.

Perennials are my preferred type of plant. Once they are well-established with their roots growing firmly into the ground you should never have to worry about that patch of dirt again. It will always produce food for you if you learn how to take care of it and act upon that knowledge accordingly. If you plan your garden out well and slowly learn to play with your garden spaces and the microclimates that exist within your grow site, through the years and with a lot of vision and foresight in mind, the end result will be a food forest in your own yard. No kidding.

My old neighbor Iggy had a yard like that. He was very resourceful and creative with pockets of food growing all over his double lot. There were berry patches, a mini orchard with four or five types of fruit trees, grape orchards and so on... Right across the street from me in rural Alberta. After those plants were well established, his work load was cut back significantly. And perennials helped him out a lot with that.

Please don't think that I am downplaying the other two families of plants by what I said above however. Biennials and annuals definitely serve a purpose in the garden. And most have a really interesting stage of their life cycle that sure decreases the amount of work required in building a garden that replenishes itself with very little assistance from you.

Self-sowing was a term I learned a bit later in my journey. The term means exactly what it describes.

The plants grow from seed, flower, produce seed and then die. When that part of the life cycle is complete, the seed pods of those plants often pop open and drop seeds all over the place, resulting in new plants during the next growing season. Sometimes they might need a little help from you by prying their seed pods open if they haven't deteriorated enough to release the seeds, but in most cases sowing themselves happens naturally. So in that way, biennials and annuals propagate themselves, year after year which would definitely serve you well when trying to grow a patch of plants meant to attract pollinators, for example.

Winter Sowing – A Great Tool for Growing More

This method of gardening will probably be unlike anything you have ever really heard about before. I learned about it when browsing on the internet one day although I cannot remember exactly where I first came across it.

It is not gardening in cold frames, it is not greenhouse gardening in the wintertime. Winter sowing is a method of gardening that creates a great deal of plants. It produces plants that germinate earlier, are very hardy, healthier and more productive than the conventional methods we use to begin growing our own food such as growing from seed, hardening off, and then transplanting outdoors or direct sowing seeds right into the soil when you are supposed to.

So what are you doing when you winter sow? You are essentially building mini greenhouses. The greenhouses will hold seeds over the winter months. These seeds germinate at a higher rate than seeds that have been sown in the conventional ways I mentioned above. Those seeds will rarely come up before the last frost. They seem to intrinsically know when it's safe to emerge. But if they do they will typically make it as they are being protected by the greenhouse structure.

Winter sowing is awesome. The winter temperatures and freeze/thaw cycles of most winter months will soften the seed coat, causing earlier sprouting, hardier plants and helping to break the dormancy of older seeds that might have otherwise been tossed into the compost pile.

With winter sowing, you only need a few things to get started: soil, water, a box cutter, a spray bottle, a pencil or other object with a pointy end and a blunt end, your seeds and a container that you can put outside in the cold, most preferably in the snow or a clear plastic garbage bag like the one used for leaf collection.

You can use containers such as clear plastic ones from the bakery section at the grocery store, or ones with clear lids. I have seen people do many things with this innovative idea. I've seen people use pop bottles that had been cut in half and inverted as well as 18 gallon water jugs.

Lids with the center cut out and plastic taped over it from the inside, is one that I tried out. I ended up not enjoying the tediousness of using individual containers and began using 2"x3" rectangular planter flats that plants from a greenhouse would normally come in. I put them outside in the snow on a flat surface in a clear plastic garbage bag that had slits cut into it.

So how does one do it? It is a bit of a messy process so protect whatever surfaces you need to (I've used a tarp and plastic sheeting on different occasions just on my kitchen table) and keep a broom and dustpan nearby.

Pick your container. If it has a clear lid you will need to cut three or four slits in the lid and the bottom of the container itself. The slits in the bottom allow for drainage, as growing plants do not like wet 'feet' (roots). The tiny slits in the top allow for air to get in. If you are using open containers (no lids) make sure they have proper drainage holes and that the clear plastic bag that you will be placing them in has 10-15 slits that have been made all over the bag. When I make the slits I try not to press too hard with the box cutter, as I want the slits on the bottom to be opened more than the slits on the top. I'll tell you why in a moment.

Fill it with soil leveling it off to at least one thumb joints width below the top. Water from the top carefully with a mister or showerhead type of watering jug, slowly until the water comes out the bottom. Or better yet, if you are doing a large number of winter sowing containers, fill them with soil to the exact depth as previously mentioned and place in a bathtub, kitchen sink or other long, shallow container full of lukewarm or warmer and let them sit to soak up the water. Remove when the top of the soil appears to be glistening with moisture and put aside to drain.

Once the containers have drained off you can begin planting your seeds.

If they are tiny seeds like mint or chives (roughly the size of poppy seeds) you can simply sprinkle them around and leave them, you can spray them into the very top 1-2mm of the soil or you can sprinkle them and pat them down into the soil gently.

If they are larger tear shaped seeds like zucchini, squash or pumpkin, make a little bit of a hole with a pencil and place the seed in the hole on its flat side. Cover it with three widths of the seed. For example, if a pumpkin seed is 2mm thick you need to cover it with 6mm of soil.

As long as you follow the three times the thickness rule, your seeds should come up alright. Water carefully by spraying well with a spray bottle but not so much that you dislodge the seed from where you placed it.

Once that is finished, if you are using lidded containers, you can put the lids on and place them directly out in the snow. With the clear lidded containers the procedure is slightly different however, only because you will need to remove the lids and create larger slits slowly over time until there are so many slits that you no longer need the lid for protection.

If you are using open containers, cut back on trips to their new home in the clear plastic bag outside in the snow, by loading them into a big pan or big plastic lid. Make sure you remember to take the clear plastic bag outside with you. Put your tray down in the snow, snap your clear plastic bag open and have the slits that are more open on the bottom touching the snow and the ones that are more closed on the top. Hold the top side of the bag open and begin placing the open containers into the bag toward the back. I have been able to fit more than thirty open containers into one clear garbage bag. Either shut the bag by twisting it like you would a bread bag and then tucking the end underneath the bag itself, or twist it and tie it off or tape it shut. It is imperative that the open end of the garbage bag stays closed.

And then you wait.

Or go and sow some more. And then wait.

As spring comes on you will need to begin checking your containers daily. As it gets warmer, the mini greenhouse will heat up a great deal. You will have to play around with this a little bit as some plants are fussier than others. If you notice that there is a lot of condensation happening or plants are beginning to sprout then you need to open one of the slits in the top half of the bag, but only a little. Air needs to escape. The plants need that air exchange to happen or they will smother, cook and die. As the weather continues to become increasingly hospitable, more slits need to be opened until all of them are open. Once that happens, keep an eye on the weather forecast and wait for a bit. You could be waiting for a couple of days, you could be waiting for a week. But when you think it's safe, slowly begin tearing the slits apart and towards each other. Eventually, the bag will be entirely open, the plants will have acclimatized themselves completely and the plants can be removed from their 'greenhouse'.

In the five years that I practiced wintersowing diligently, I have never had plants damaged by frost. I have definitely had them damaged by heat. More than once. Just a heads up.

In addition to experiencing the excellent germination rates of fresh seeds when winter sowing, another bonus that I witnessed was the incredible germination rates of winter sowing when using older seed. One year I planted 184 mini flats. A sizeable portion of those seeds were more than 5 years old. 182 of those mini flats germinated. I was ecstatic, especially after being worried for a time that those seeds wouldn't germinate. With that experience, I fully realized the remarkably positive effect winter sowing had on germinating seeds in addition to being able to produce so many seedlings to plant in such a small space.

Growing Plants Indoors – A Brief Overview

There are a ton of books on greenhouse gardening. If you are going to be starting plants inside, I suggest that you look around for some good books on the subject. I imagine that Amazon will be able to show you which ones are good based on the reviews and ratings. But, as a precursor to that possible pathway for you, there are a few things you should know.

The grow light bulbs that are sold for more than \$20 a pop are not necessary for an indoor greenhouse setup. I DID get into grow lights in the first year or two, but after doing some research I realized they were not necessary to grow healthy plants. One cool and one warm bulb set into a shop light will meet the light spectrum requirements of your plant babies. One to two seedling trays per shop light is enough. If you are germinating seeds with your 'growlights', the closer you can place your shoplights to the trays the better, and I am talking close. One inch is decent. Fluorescent lights provide a small amount of heat which is important for germinating seeds, but the heat and close light will not burn your plants. The longer you are able to keep your plants close to the lights the better off they will be. They will need around 18-20 hours of light per day. A timer from the local hardware store can be very helpful in this case, unless you can find a four hour window in your day where you will be around to turn the lights on and off for your seedling babies.

Once they have sprouted, you still don't need to move your plants anywhere just yet.

You will know that your plants are too far from the light if they begin to grow really tall, long stems up towards the light. This is called getting 'leggy'. A plant will do as much as it can to get the light that it needs, including growing a very weak, thin looking stem. Once they become leggy, it is very difficult to correct and a plant is often weakened significantly when this happens as you want both a strong stem, a well-built root system and healthy, firm leaves. A tomato plant is about the only plant I can think of that can benefit from becoming leggy because when you transplant it, you can sink the stem of the tomato plant right up to the base of the leaves and not have to worry about killing the plant – tomatoes will grow more roots off of any part of their stem that is buried below ground.

I have nursed many leggy plants right through to transplant time. Sadly enough, the time I spent caring for them and trying to keep them from dying was rarely worth it. They were often too weakened to make it through the process of 'hardening off' and transplanting outdoors.

I cannot stress the importance of keeping the fluorescent tube lighting as close to your plant babies as possible.

Another thing you need to be aware of is something called damping off disease. I don't know exactly why it happens. But, if I remember correctly, it is due to fungi or fungi-like organisms that are sometimes present in the soil. What you will witness is seedlings that seem to be doing alright, suddenly keel over and wither at the base of the stem right at the soil line where the seedling meets the soil. The seedling stem will shrivel at the soil level, fall over and die.

Sometimes, this can happen in less than a 24 hour period. And there is no treatment that you can apply to a plant once dampening off disease has taken hold to save your babies.

You can lose an entire tray of plants to this disease. After the first couple of times that happened to me, and I determined what was going on, I picked up a chemical at the local

garden center called 'Damp Off'. I got it home and opened it. It smelled like a cross between nail polish remover and rubber cement.

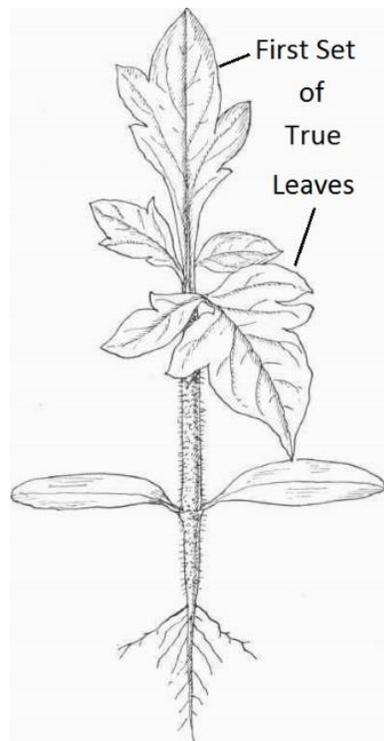
Not safe. Not for food. Not smart. No go.

So I went to the net and did a bunch of reading and found some preventative measures I could take to give my plant babies the best chances for survival. Proactive prevention is always a better approach if you are aware of the possible pitfalls.

What I learned was there are two things you can do to combat this: A) cinnamon sprinkled over the soil and B) make a strong cup of chamomile tea, put it in a spray bottle and spray the entire plant along with the surface of the soil. Both have anti-fungal properties, work very well and neither will harm your seedlings. I've tried both and have never run into a problem with dampening off disease since, as long as I use one solution or the other.

Adding a bit more aeration by running a fan, increasing the temperatures by a degree or two, leaving a door ajar or lifting up/leaving off a smaller piece of the plastic or a window that is covering your greenhouse will also be helpful.

Other than those two things, check your plant babies regularly and do not over water them. If the surface of the soil looks dried out they probably need a drink. They do not require fertilizer until they have at least their first set of true leaves.



(Side Note: When a seed sprouts, there are two leaves that emerge first. They are often long and tear shaped. The next set of leaves to appear growing from the center of the seedling are the true leaves).

Then fertilize with a weak solution of vermicompost or compost tea every two weeks or so.

Talk with them, tell them your stuff, and be grateful to them for the life that they are going to be sharing with you and giving to you.

Hardening Off Plants So they Can Go Outside – A Lesson in Creativity

This process is about slowly toughening up plant babies so they can eventually be outside full time and in the dirt. If you take a baby plant from the environment of a still, temperature regulated greenhouse and just place it outside haphazardly in the elements without initial protection and leave it there, it will most likely perish. Plants are somewhat like many of us. Too much of a drastic change stresses them.

If they don't die, you might witness a weakened plant that has a reduced level of food production or a higher susceptibility to pests or diseases.

My first year or so of gardening out in the country, I spent a lot of time hardening off plants and dragging planting trays in and out of the house. It was tedious and very time consuming but I will quickly tell you about it in case you are starting out with a small amount of plants that need to be hardened off.

Hardening off is a process that you need to take extra special care with. Work very carefully with your seedlings. I cannot stress that enough.

You must pay attention to what is going on in the environment around your garden. If grass and weeds are beginning to grow and the leaves on trees are beginning to unfold it might be time to begin hardening off your plants. If you are in a cooler climate and the temperature is still going below the freezing point at night still, it might be too early.

I began experimenting and changing my strategies to find a more effective way.

Hardening Off Using a Temporary Greenhouse

I have taken half of a flat of tomato plants (tomato plants have often been super hardy for me) and transplanted them (transplanting will be covered in the next section) directly outside before the last frost in my area because they were getting too tall. I have done this many times, but I always transplanted them very quickly on a warmer than normal day and provided serious cover for them. The planting holes were pre-dug, the amendments required were placed down hole before I started and everything I needed in hand was set up right there for me within reach. In other word, preparation ahead of time is KEY.

Once the tomato plants were in, I drove long sticks down into the soil inside and around the perimeter of the tomato patch that were much taller than the plants and threw plastic sheeting overtop making sure that the plastic wasn't touching the plants. The plastic was weighted down around the edges with rocks or wood or whatever I could come up with to prevent too much initial air flow. A white bed sheet was finally thrown over top to provide light shade for a week to acclimatize them. They got bright light, but no direct sunlight. Again, with this method you are creating a mini greenhouse and providing them with protection so they can get used to being outside. So they can adapt. This is what acclimatizing means.

After that first week, I would begin helping them to get used to being out there further by taking off the sheet for a couple of hours first thing in the morning and exposing them to natural light. If it was pretty warm outside I would keep my eyes open for too much condensation forming inside the plastic and open up one end to let some air in so they wouldn't get too hot. As the days passed, I would expose them more and more to light and the air temperatures outside until I could take off the entire cover during the day and then eventually leave it off overnight too when the night temperatures stayed well above zero.

I have tried this acclimatization process with only the toughest of plants like tomatoes, Swiss chard, greens like lettuce and kale, and the hardier herbs like parsley and chives.

If the temps were definitely going to drop below zero for one particular evening, I would fill four or five 4L milk jugs with the hottest water from the kitchen tap and place them equal distances apart under the plastic so the heat from them was distributed evenly throughout, making sure they weren't touching any plant leaves. I would also throw one or two huge blankets overtop the whole thing making sure that whatever I was using to hold up the plastic would hold the weight of the blankets. In the morning I would carefully check in with what was going on with the plant babies. And if the air temperature outside was too cold, I wouldn't move a thing until it had warmed up outside some.

Greenhouse plant babies have never experienced the wind or the total contrast of daytime and nighttime temperatures. Nor have they experienced the full force of the sun. The grow lights in a greenhouse do a great job of doing what they were meant to do. But just like us, most plants don't thrive to their full potential under artificial light. Natural light and full sun for most crops is the ideal.

I am aware that some or all of the above might sound a little troublesome... But, without a greenhouse, I needed to be creative, and I was able to extend the growing season up to four weeks or more in some years with this method. Which meant a longer growth period for sections of my garden and in the end, a lot more food.

Transplanting – Please Don't Worry... It's Not Rocket Science

Once you have hardened off your plants, they are ready to be transplanted into their (hopefully) permanent homes. Moving plants around in your garden is also necessary on occasion if plans change or if the spot where you originally planted them is not working out.

Transplanting requires little of you other than patience, time and gentility. You will be removing this baby life form from one habitat to another so caution and care is necessary.

Relocation of a plant from a pot or seedling flat into the ground will take a little bit more work for you to prepare, than direct sowing (planting seeds right into the ground). The holes in which the plants will be placed can be dug one by one as you transplant along or all of them can be pre-dug beforehand. The plants need the best start possible and the roots need to be placed in a 'down and out' direction, so make sure your planting hole has been dug to a decent depth and width. The rule of thumb that seemed to work for me was to dig holes that were at least 2-3 finger widths wider and deeper than the root ball of the plant. You want to avoid bending the roots of your plants to the point where they break, so ample room to pop the plant down into the hole is important. If there are any soil amendments that need to be added to the planting hole, it is best to add them before transplanting and mix them well through the sides and the bottom of the hole. I will get into soil amendments later in Chapter 5, but I have found tools

such as a hand shovel, forks, knives, spoons and sometimes a bulb planter to be really helpful in getting the job done.

Whatever you are transplanting needs to be watered well and allowed to drain as early as possible, preferably first thing in the morning. Any sort of transplanting or major undertaking that causes stress to a plant should, if possible, always be done early in the morning or much later in the day. High temperatures during the day cause a great deal of stress on plants when they are being transplanted out, relocated or divided. If you do transplant out in the middle of the day, a very deep watering and a great deal of shade is necessary for at least that first week to give the roots a chance to grow and set themselves down into the soil. I have used all sorts of things as shade barriers, from sheets to old plywood. This is a serious opportunity to get creative!

Remember, the less stress you cause your plants, from spouting to planting, the better they will do in the end – less susceptible to disease, pests, stronger in constitution and more productive.

If you are handling a delicate seedling that is coming out of a pot, a fork or butter knife is the best tool to use. Simply hold the container or pot with one hand, slowly pry the pot away from the soil by running a sharp knife all the way around the outer edge of the pot, between the pot and the soil. You might be able to slowly and carefully pry out the plant with the fork. Sometimes carefully squeezing the pot will loosen the pot away from the soil. Or you may have to turn the pot on its side, holding half of your palm across the top of the pot to contain the soil with the stem of the plant between your index and middle finger to stabilize it. Tap it gently one or two times on the bottom or side and it should come sliding out. Try not to break the stem or any leaves. And please don't fuss too much about the roots. Just handle them carefully. You will get a handle on this skill with time. I promise.

If you have planted multiple seeds into a seedling flat or pot, you will have to change your strategy slightly. One of the ways I dealt with this was to either take the whole ball of soil with the seedlings out and put it into a container and slowly separate each plant from the main ball of soil and transplant them. Another approach I've taken, was to divide plants that were a little more mature up with a knife. For example, I had planted 6 tomato seeds into a 2" x 3" seedling flat. They were growing their second set of leaves already and I was ready to plant them out. So I used a very sharp, clean knife and sliced downwards into the soil, dividing the flat into 6 sections with one tomato plant per section. Almost like I was cutting something that I had baked. It worked very well for those tomatoes. You can also cut them out of their container one by one, or tease them out with a fork very gently.

Whichever method(s) you choose, once you have your individual plants separated and ready to transplant, place them in the planting hole at a depth where the base of the stem will sit right at soil level. Back fill with soil around the edges of the plant in the hole, till the soil is level with the rest of the garden. At this point, you can carve out a watering dish and water deeply by filling the watering dish, letting it soak in and refilling it two or three times and leave it be. It

might look a little unhappy for a couple of days but after that it should perk right up and in a week or two you can begin fertilizing.

(As a side note, I was able to rehabilitate a larger tomato plant when I partially broke its stem after dropping the poor baby during a klutzy moment. I was frantic and very much attached to these little lives that I had worked so hard to care for. I had no idea what to do. I simply followed what seemed to make sense to me. I carefully wrapped the broken portion loosely with some moistened but squeezed out thin, raggy cotton flannelette strips. I put the plant down and dug a larger, longer-than-normal hole in the shape of an oval and after providing a decent cushion of amended soil on the underside where the break would be by packing it down well underneath, I then placed the tomato plant sideways in the hole, with its ball of roots to the left and the top of it to the right. I continued adding soil starting on the root ball end and packing it down carefully as I went, right up to the top level of soil. After that, I carefully scraped away enough soil around the stem of the plant in a circular shape to make what you could consider to be a watering dish for the plant. I filled the dish shape depression to the top with water three or four times and trusted it to heal itself. In six weeks, we were harvesting salad tomatoes every night for supper and it was one of the biggest, productive plants in the garden that year. I was so so happy.)

Root Bound Plants – You Might have to be a little rough here



Here is where you might need to change things up slightly when transplanting...

If you have plants that have been in their pots for a while, whether store bought or home grown, they might have become what is called 'root bound', which simply means that the roots have become tangled up in a big way. They might be poking out of the holes in the bottom of the containers, or they might be in a huge, thick mass all the way around the outside of the root ball.

When you are transplanting, you don't want the roots to stay root bound. The faster you can get the roots travelling out and into the soil, the quicker your plant will recover and begin to grow into its new home.

You need to create a looser root ball if you can, removing as much of the old soil as possible in order to provide the plant with the best chances for survival.

So I have dealt with root bound plants in one of two ways:

If the roots are of a larger, thicker nature, or are massed around the entire base of the plant I would try to poke the tips of my fingers through the roots carefully, wiggle them around, tickling the root ball so to speak, prying loose the roots and soil.

If there are a ton of roots that are very thin, making one huge mass in which you can't even see soil at all, you might have to up the level of intervention required with the plant.

I would simply grab a very sharp, clean paring knife, and make careful cuts 1-2" deep all around the outside of the root ball by simply pushing in the knife and pulling it out. (I always feel grief when I do this to them, but I think they know it's to help, and I trust in them to go on to grow – I have never had a plant die after doing this, it always went on to thrive)

Once either of those have been done, you can fluff the roots out a bit more by tickling the bottom of the root ball and again, place it in the planting hole at a depth where the base of the stem will sit right at soil level.

If you have no root bound plants, the process is the same. Place them carefully in the hole, backfilling with soil till level with the soil surface, carve out a watering dish around the plants and water well.

Leave them alone, tell them that you love them and appreciate them, and mean it and they should make it through a-ok.

(As a side note <<< Tomatoes are the only plant that I have grown that I know love having their stems buried quite a bit deeper than soil level. This helps them to form a much stronger elaborate, which makes for a much stronger plant. Plants like cucumber and sunflower, on the other hand strongly dislike their roots being disturbed let alone being transplanted on the whole. I have rarely had either survive when grown in pots and then transplanted. Direct sowing is best for those two. Just a heads up.)

A Special Note on Watering Outdoor Plants

Plants can become stressed out very easily. Watering them in the middle of the day is one of the most stressful things for them. The absolute best time to water is first thing in the morning just as the sun is beginning to come up or more ideally even earlier. When I did happen to get myself a watering timer attached to the garden hose outlet on the house, I always had it set for 4 a.m...

If you water deeply at the soil level using the watering dishes I wrote about earlier and you have healthy soil and a lot of mulch down in your garden, you should only have to water deeply once or twice a week. Watering deeply encourages the roots of your plants to travel down further to find water which makes for a stronger root system and in turn a stronger plant. If you

are watering below ground, and have healthy soil and a lot of mulch down in your garden, you might only have to water once a week.

The second best time to water is between very late afternoon and early evening, at least an hour or two before the sun goes down, so that whatever water has landed on the leaves can evaporate.

In my own journey, I realized that when I watered in the middle of the day not only did the water evaporate quickly essentially being wasted, but it never really reached the roots and when I watered the plants from above, leaving the water to pool or sit on the leaves, they would often become scalded from the rays of the sun. When I watered too late in the evening, mildew started to take over because the leaves and the soil stayed too wet for too long.

I learned a great deal the hard way. I hope to save you some grief and encourage successful outcomes for you by sharing my occasionally epic failures throughout Growing Empowered. A willingness to try, even after failure has been one of my greatest teachers.

Over time, I learned that I was the last person in my life that I should give up on when it came to learning, creating, growing and exploring in the garden. I need that connection like I need to breathe.

List of Self Sowing Plants (There is more info in the supplementary data.)

<u>Annuals</u>	<u>Biennials</u>	<u>Perennials</u>
alyssum bachelor button blue woodruff bupleurum 'Green Gold' calendula celosia centaurea cyanus clarkia amoena cleome hassleriana coreopsis cosmos sulphureus cynoglossum amabile eschscholzia californica feverfew gilia impatiens balsamina lavatera trimestris mirabilis jalapa morning glory nasturtiums nicotiana nigella orlaya grandiflora poppy rocket larkspur rudbeckia hirta scabiosa atropurpurea silene armeria sunflowers sweet alyssum sweet pea verbena bonariensis viola tricolor Vegetables: amaranth arugula beets broccoli raab carrots collards lettuce mustards orach parsnips pumpkin radish rutabaga spinach tomatillos tomato tomatoes turnips watermelon winter squash Herbs: basil, chamomile, cilantro, cutting celery, dill, parsley	beets bellis broccoli campanula carrots collards, kale evening primrose forget-me-not foxgloves hesperis hollyhock icelandic poppy lunaria mullein parsley parsnips sweet william wallflowers	Achillia aquilega (columbine) asclepias (milkweed) blackberry lily columbine delphinium dianthus helebore hellebore liatris lupin lychnis monarda pansy phlox primula purple coneflower scabius sweet rocket

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Creating Healthy Soil
the
Natural Way:

Best Practices and
Things to Know

When approaching the writing of this chapter I wondered how I could possibly demonstrate to you, just how crucial naturally healthy soil is to the process of growing nutrient dense food and why that should matter to us as a species a great deal.

How can we find understanding and value in things that are invisible to the human eye?

Science supports all of it. They have the special machines and equipment to study everything I will tell you about in a moment. Most of us don't have those tools. We can only witness certain things in the field of our learning, exploration and experimentation. There will be multiple studies, books and websites cited in the back of this publication that can lead you on to a more in depth study of these areas of knowledge.

But, I will share with you the very basics of what is important...

There is a world teeming with life all around us. There is a great deal that we cannot even begin to truly understand. Human beings can only see 4% of the light spectrum that exists in this world with the naked eye. We can't see microwaves, radio waves, electromagnetic waves, ultraviolet rays and more. Much is unknown to us.

But, what can I tell you about what I have read? What I have experienced? And what I know to be true?

Plants are alive. They are full of intelligence. They feel. They intuit future events. They are intrinsically sentient.

There are mechanisms that exist within them, that are so incomprehensible that it is difficult to believe that they are even real...:

"...Indian licorice, or *Arbus precatorius*, is so keenly sensitive to all forms of electrical and magnetic influences it is used as a weather plant. Botanists who first experimented with it in London's Kew Gardens found in it a means for predicting cyclones, hurricanes, tornadoes, earthquakes and volcanic eruptions...

...Frontiersmen and hunters in the prairies of the Mississippi Valley discovered a sunflower plant, *Silphium laciniatum*, whose leaves accurately indicate the points of the compass...

...The Virginia knotweed can tie a sailor's knot which is put to such a strain when it dries that it snaps; hurling the seeds to germinate as far as possible from mother..."

The above excerpt is from a book called, 'The Secret Life of Plants,' written by Peter Tompkins and Christopher Bird in 1973. Everything I just said in the excerpt above is explained in great detail in this book.

I discovered *The Secret Life of Plants* somewhere in the mid-2000's. It completely altered how I perceive the Natural World and I was really fortunate to come across it. 'Secrets of the Soil' was another book that I only discovered recently. It was written by the same authors and was an incredible read. I was able to locate both books, which are extremely rare and out of print, in e-format. They are

attached in the supplementary data files on www.growingempowered.org under 'Must Have Literary Resources'. I strongly encourage a long, slow thorough read (read: absorption) of both.

There is a natural world out there that we know so little of. Mankind has studied plants with their tools, machines and equipment. All of the studies that I have been able to find, appear to be true. I have come across people that have specialized in mind-blowing fields of study that I wasn't even aware of or have heard nothing about. The journeys that some have undertaken are truly remarkable.

So is it that difficult to believe in a global society impacted by new discoveries in the scientific fields of nanorobotics, 3D printers and quantum physics that the life that has surrounded us for millennia embodies consciousness as well?

Anything anything anything is possible, I say.
And the Land is alive.

The medium that we grow our food and medicine in is profoundly important. The soil that exists in most places around the world has become incredibly depleted due to continuous use without any replenishment. Environmental pollutants in soil are also increasingly common.

This chapter focuses on sharing knowledge you can use to heal what may have already come to pass in the land around you and create a vibrantly healthy growing medium for food and for the future.

What follows are actions you can undertake and systems that you can use to build new soil and/or revive worn-out, sometimes lifeless dust into a living, thriving soilweb that will heal the land and increase the nutritional content of your food.

The Space We Grow Food in Is a 'No Till Zone'

So when I write, "No till," I mean just that.

No rototilling, no double digging, no killing your back.

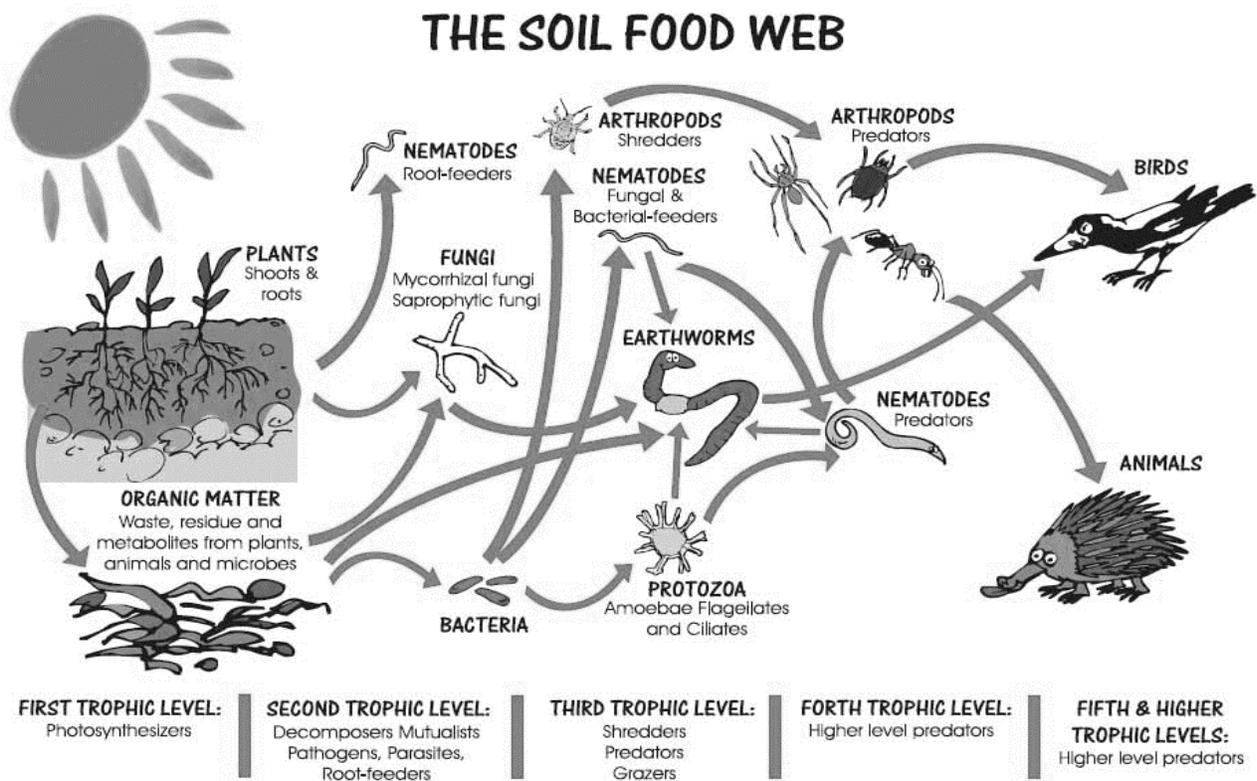
No renting or buying a tiller.

No messing around.

Another thing I learned, yet again, the hard way.

I did own a \$500 tiller back when I first started at the lot in Rural Alberta. The yard was so big. And I thought that I needed it because of the initial information that I had gotten my hands on. How was I going to get such a big job done without it? It was a great little machine that did the job very well. BUT. It was a pain in the ass. And the engine crapped out so many times and after a few uses, I could never get it to work because it was a 2 cylinder engine. Not a 4. Which I knew how to play around with a bit, but not enough. And none of the old timers on my block could figure it out either.

Another thing that I realized... No matter what kind of residential or commercial tiller you have, no matter what make or model, no matter how extravagant the expense... You are ALWAYS going to find soil somewhere that a tiller cannot break through.



In one of the gardening classes that I used to teach, one of my students had a story that depicts my realization quite well...

Her husband had bought her a \$1700 tiller when they moved to their new farm. She went to use it around the yard to make some new flower and veggie beds and she damaged the thing trying to break ground. She gave up planting that year. And the tiller breakdown was not covered by warranty as it was not a manufacturer's shoddy workmanship that put it into a state of disrepair. He went out and purchased a \$2,600 tiller at the beginning of the next growing season and the same damn thing happened. She had such hard pan clay all over her yard that both rototillers were completely ineffective in doing their job and broke.

So first off, there is that downside to rototillers. They are expensive. Sometimes you will have a soil base to work with that is unmanageable and untouchable for a tiller. And I have ran into many a gardener that has killed their body trying to operate one unless it something like a Mantis Tiller from Vesey's on the Eastern Coast of Canada. Those suckers are light. And that is what I had.

But, when I discovered what I am going to tell you about in the next section, I gave the tiller away to my old neighbor Iggy, who had a friend of a friend that could fix it for him.

Aside from what I wrote about above on the cons of using a rototiller itself, there is the issue with what it does to the soil.

When you tear through the Earth, you are tearing through life. When you leave the Earth alone, the Earth thrives. Every time those tines on the tiller go through the Earth, it aerates the soil and tears apart the soil layers. Which isn't exactly a good thing.

One teaspoon of soil contains the following:

- 1 million (in arid soils) to 100,000 million bacteria (in forest soils) [1 million= 10^6]. Bacteria break down easy to-use organic material (sugars, proteins, carbohydrates), retain nutrients, like N, P, and S in the soil and combat disease causing organisms.
- 150 to 500 micrograms of fungal hyphae. Fungi break down the more recalcitrant, or difficult-to-decompose, organic matter (like newspaper, cardboard, bark, sawdust, corn stalks) and retain those nutrients in the soil as fungal biomass.
- 10,000 to 100,000 protozoa. These organisms are one-celled, highly mobile organisms that feed on bacteria and on each other.
- 15 to 500 beneficial nematodes. Beneficial nematodes eat bacteria, fungi, and other nematodes.
- A few to several hundred thousand microarthropods. These organisms chew the plant leaf material, roots, stems and boles of trees into smaller pieces, making it easier for bacteria and fungi to find the food they like on the newly revealed surfaces.

All of these little lifeforms exist in the top couple of inches of the soil. They are a part of vibrant, healthy, thriving soil. They are a requirement to create life. They are necessary for creating nutritionally dense food.

A No Till Gardening 'How To':

"...Gardeners traditionally dig, or turn over the top layer of soil before planting to get rid of weeds, and make it easier to use fertilizers and to plant crops. This also speeds up the decomposition of crop residue, weeds and other organic matter. Tilling the soil is often the most strenuous of a gardener's tasks.

A complex, symbiotic relationship exists between the soil surface and the underlying micro-organisms, however, which contributes to a natural, healthy soil structure. Digging into the bed can interfere with this process and disturb the natural growing environment. It can also cause soil compaction and erosion, and bring dormant weed seeds to the surface where they will sprout.

With 'no-till' gardening, once the bed is established the surface is never disturbed. Amendments such as compost, manure, peat, lime and fertilizer are 'top dressed', i.e added to the top of the bed where they will be pulled into the subsoil by watering and the activity of subsoil organisms. Weeding is largely replaced by the use of mulch. By adding material in layers, the underlying soil surface remains spongy, making it easy for the young roots of newly planted seedlings to work through the soil. This is similar to the way soil is formed in nature.

Benefits of no-till gardening

Promotes natural aeration and drainage.

Worms and other soil life are important to healthy soil structure, their tunnels providing aeration and drainage, and their excretions bind together soil crumbs. No-till systems are said to be freer of pests and disease, possibly due to a more balanced soil population being allowed to build up in this comparatively undisturbed environment, and by encouraging the buildup of beneficial soil fungi.

Saves water.

Thick layers of mulch allow water to pass through easily while shading the soil. This reduces water lost to evaporation while maintaining a moist growing environment beneficial for root growth.

Reduces or eliminates the need to weed.

Most garden soils contain weed seeds which lay dormant until the soil is disturbed and the seeds become exposed to light. With no-till gardening, these seeds will remain dormant indefinitely. Of course, some weeds will appear in the beds, borne by wind or birds. These weeds are easy to remove by hand if you pull them early in the morning or shortly after watering, while the soil is damp.

Saves time and energy.

Whether you turn your garden beds by hand or use a gas-powered rototiller, you'll save energy by using the no-till method. Although some effort is required in gathering materials for

mulching, and applying the mulch during the growing season, no digging or turning of the soil is required.

No-till gardening helps soil retain carbon.

Healthy topsoil contains carbon-enriched humus and decaying organic matter that provides nutrients to plants. Soils low in humus can't maintain the carbon-dependent nutrients essential to healthy crop production, resulting in the need to use more fertilizers. Tilling the soil speeds the breakdown of organic matter, which releases nutrients too quickly. A steady, slow release of nutrients is more beneficial to plant growth.

Builds earthworm population.

The moist conditions of the soil beneath mulch creates the ideal environment for earthworms, whose activity aerates the soil and stimulates root growth.

Helps reduce soil erosion.

A lack of carbon in soil may promote erosion, as topsoil and fertilizers are often washed or blown away from garden beds.

Methods used in no-till gardening

Use mulch liberally, in layers.

Mulch is an essential part of no-till gardening. A thick layer of mulch will keep the soil from drying out and crusting over, which restricts nutrient and water flow to the subsoil. It also reduces water loss due to evaporation. Mulch will provide cover for soil insects and often dramatically increase the earthworm population. However, mulches can also introduce weeds to your garden bed. For example, try to use straw instead of hay because fewer weed seeds are found in straw. Leaves, especially from deciduous species such as Maple, add valuable nutrients to the soil but should not be layered too thickly. Thick layers of leaves can form 'mats' which restrict water penetration and harbor insects. You can intersperse layers of straw with leaves, for example, to prevent matting.

When planting seedlings, pull the mulch back and dig into the surface just enough to set the plant.

The depth of mulch can be only a few inches when seedlings are first planted, then added in layers as the plant grows. Pull mulch away from the stems of tomatoes, peppers and long-stemmed plants. Beds left over winter can benefit from mulch 12" – 24" in depth.

The following lists common materials used for mulches:

- **Grass Clippings** – Cut grass before it goes to seed. Fresh 'green' clippings will add nitrogen to the soil, which helps plants grow. If you let the clippings turn brown, you will

get the mulch effect without adding nitrogen. (As plants begin to fruit, nitrogen should not be added.)

- **Newspaper** – Avoid using paper with colored inks; can blow away in the wind.
- **Yard waste** – Cut up any branches or woody material.
- **Compost** – Needs to be ‘finished’ compost so as not to attract pests. Compost is a good early season mulch, but as the plant begins fruiting, you should withhold sources of nitrogen.
- **Hay** – Good mulching material but beware – weed seeds may be introduced.
- **Straw** – Good source of carbon; excellent mulching material.
- **Seaweed** – Adds trace minerals, deters slugs. Should be applied liberally because seaweed shrinks considerably when dry.
- **Fine bark** – Can be acidic. You may need to add lime at the same time.
- **Wood Shavings** – Avoid shavings from chain saws or tools that leave oil residues, use small amounts at a time or add it to your compost bin first to break it down.
- **Leaves** – A valuable source of carbon, leaves make excellent mulch. Apply in thin layers, or intersperse with other materials to prevent matting. Sprinkle soil on top if needed to prevent leaves from blowing away in a strong wind.
- **Forest duff** – Pine needles, twigs, woody bits are useful, but can be acidic so use a small amount.

‘Top dress’ amendments.

Even a well-established garden bed will need regular amendments added during the growing season, and in spring and fall. Compost, peat, lime, wood ashes and other material are easily added to the bed without digging them in. Spread this material around the plants where needed, and add mulch to cover.

Cut back on watering.

The use of mulch retains moisture, thereby reducing the need for frequent watering. Reduced watering also helps minimize soil compaction and the germination of unwanted weeds. Drip-irrigation techniques are very helpful in this regard because water is delivered to root zones, without being wasted on unplanted areas or pathways.

Cover crops

These can be planted during the off-season for a garden bed as a way of discouraging weeds from becoming established, and to return essential nutrients to the soil. Crops such as crimson clover, oats, rye and hairy vetch are referred to as ‘green manures’ because of the fertility they add to the soil. Rye should not be planted preceding small-seeded crops like onions or carrots.

To replant a bed which has been planted in a cover crop, lay dark plastic sheeting over the bed and weight down the edges with rocks. Heat will build sufficiently to kill the plants, then vegetable seed or transplants can be set out after removing the plastic. Ideally, allow two weeks before planting to allow crop residues to break down, releasing nitrogen for the new seedlings. This method takes time, however, and can conflict with the spring planting schedule. Another method is to hand pull the cover crop where you want to place the seedlings, and cover the remaining cover crop with a thick layer of mulch. Another method is to cut the cover

crop to a stubble, then gently work the stubble into the soil with a hoe. This process compromises the 'no till' method, but can still be sufficient to allow early planting.

Winter cover with hay.

A simpler alternative to planting cover crops is to place a thick layer of straw and leaves over the garden beds for the winter months. This layer needs to be deep, as much as 2' deep, to keep weeds from sprouting. In the spring, the pile will be lower. When ready to plant, the mulch can be simply pulled back to dig the hole with a hand spade for the plants. Some gardeners report this method encourages voles and other pests who nest in the straw and burrow into the soil. It is best to experiment with this method on a small part of your garden to ensure its effectiveness in your growing region.

Avoid compacting the soil.

Avoid stepping on the bed, as this compacts the soil. If the bed is wider than 4', a board or stepping stones can be set in place on the bed. If a board is used, flip it over occasionally to allow the underside to dry out and to expose any slugs or snails.

It should be noted that "no-till" does not mean "no-work". As the mulch breaks down and settles into the soil, new mulch needs to be added. This should be done in a timely way, because if the soil surface is exposed to direct watering, and heavy rain, it compacts. You may need to break up (till) the soil before planting the next crop, and this defeats the purpose of the no-till method.

In conclusion, no-till gardening requires some experimenting to find the right techniques for your growing region. Ideally, one or two 'extra' beds in the garden can be used for testing cover crops and spring planting methods. Over time, the remaining garden beds can be transitioned to no-till. If you have a good supply of mulching materials and reapply them as necessary throughout the growing season, you can enjoy the benefits of a productive garden with less work in the spring, less weeding and less water used throughout the summer..."

Aaaaand right there is a great segue into...

Composting – Creating Life for your Soil

When I first crossed paths with composting my mind was blown.

Who ever thought that putting yard waste and kitchen scraps together could create something so vital for soil health? I sure didn't.

First, I read a few books. Tried it out. Made a lot of mistakes. Then I actually took a course on it, which helped a great deal.

There CAN BE a LOT of science involved in learning about composting: what it is, the processes that are involved and the mechanisms that are at work in both compost and in the soil pre and

post amending. There are many books out there on composting and I will recommend a few of the ones I really enjoyed in the back matter for you to check out for yourself if you like.

In this chapter, I am going to go through the 'need to know' stuff.

To start with, composting is intentionally combining organic materials in a particular way that will cause them to decompose. The resulting organic material is full of nutrients, minerals, and healthful organisms that nurture and fortify the health of your soil and the biological systems that reside in plants, in turn increasing the nutritional value of your food.

That is the very bare bones, semi-scientific explanation of what composting is.

(A Side Note: Organic life will eventually break down over time if left completely untouched. If you pull back the surface vegetation on the floor of a relatively untouched natural forest, you will see that the soil is full of life, cooler in temperature and moist to the touch. It will smell like earth or maybe even rain and feel fluffy and soft. This is compost. And if left alone, nature will perform this beautifully all on its own.

The Earth has amazing mechanisms in place to support life on this planet. Auto-composting in the forest is one of them and the Earth does this without any assistance from us.)

Plants absorb air and water from the atmosphere and release oxygen as a part of their basic biological function. Vegetation from plants such as leaves and needles, die and fall to the ground, eventually becoming absorbed back into the Earth via auto-composting. Plant roots burrow down and out into the Earth seeking nutrients, minerals, and water. The vegetation, moisture and anything else present in the soil provide this for plants. Through the roots they draw what they need up into themselves and then they become dormant for the restful season of winter.

All of it goes back to the Earth, over and over in a never ending cycle.

If you have no time to compost but you have the space to do it, pick an out of the way spot and throw what you have there. Nature will slowly take care of it and after a year or so if the pile is not covered over, you will most likely find the finished product in the middle of the pile by spring or fall of the next year if you don't turn it or continue adding to it. You can use this composted material to make compost tea, mulch your plants or 'top dress' your garden in general.

If you want a regular supply of compost that will feed your soil and inoculate your crops with stabilizing and strengthening nutrients and microorganisms then please follow what is next.

Initial Setup

First things first, location is important. There are a few things that you need to consider: Do you want it a bit closer to your living space for ease of use when you need to drop off your kitchen waste? Or do you want it closer to the garden? Are you going to be tending to it regularly? Depending on your set up, a halfway point between home and garden might be ideal.

An ideal location also includes a sunny spot that isn't going to be hit with an excessive amount of precipitation (ie. Don't park a compost bin right near a downspout) that has decent drainage if possible. Compost that gets too much moisture will usually begin to smell. Some room to work would also be wise.

How you are going to set up your compost bin is the next step that you need to look at.

Some people still use those taller, black, plastic upright bins that have the opening at the bottom to get at the compost. That type of bin was my first composting bin but once we started using it, it became very cumbersome and difficult to stir and move around. I changed how I was doing things when we got out to the country.

I've tried composting with a roll of poultry mesh shaped into a cylinder, lacing up the edges with wire. It worked alright but it still wasn't what I wanted.

I've also simply picked a spot and threw everything into that pile until I was ready to add it to the garden. That worked pretty alright but it was a tad unkempt.

I've also dug planting trenches, threw in the food waste along the bottom of the trench, spread a few inches of soil overtop watering it in, backfilling again if needed until the soil was level and either direct sowed or transplanted seedlings straight into the trench.

But, my favorite set up was a three bin system built out of untreated hardwood pallets. It was pretty easy for me to build, easy to manage the materials going into and coming out of it, it broke down things quickly because there was ample room to move materials around for mixing and it was really easy to get the finished compost out that was ready to go into the garden. This set up made a very large amount of compost in a shorter period of time. You can also build one out of logs or heavier sticks.

You might have to play with a few compost setups before you find one that you are happy with. And that is okay. The most important thing is that you make one and add to it.

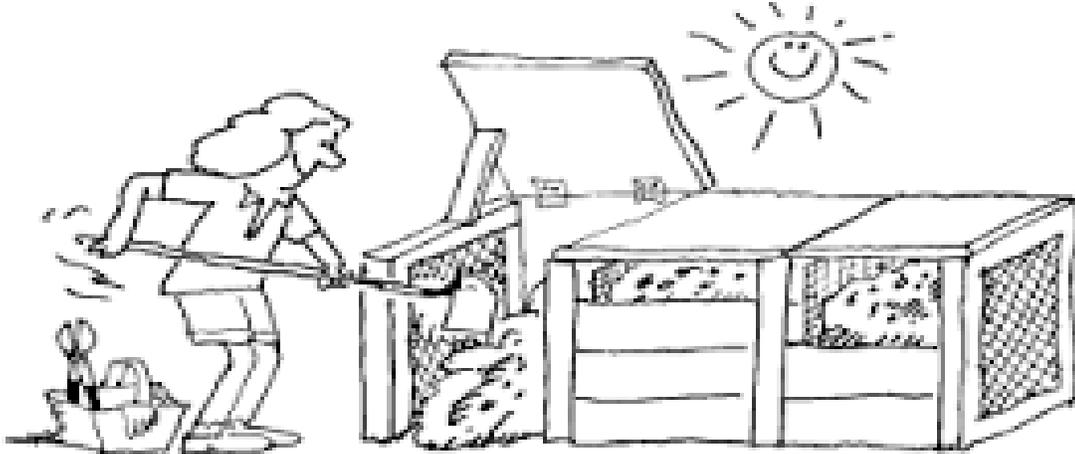
Here are some ideas:



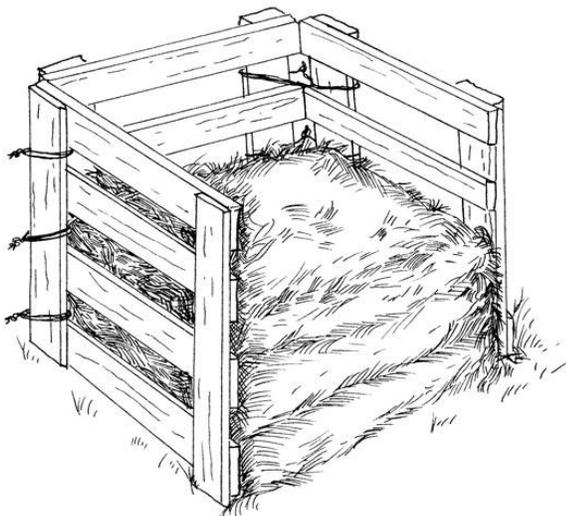
Wire mesh cage compost

Common Black Bin

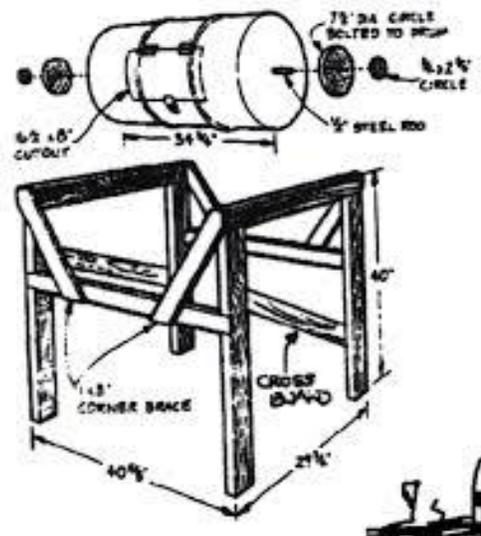
Rolling tumbler



Three Bin setup (similar to what I had)



Pallet Composting Bin



Stationary Compost Tumbler

What Goes into a Compost Pile?

The things you add to a compost pile are pretty important. You will need carbon based materials and you will need nitrogen based materials.

The carbon based materials are usually called 'browns' – 'dead' stuff. They are dried up, dead materials like dried leaves, hay, or straw or even dried grass.

The nitrogen based materials are often called 'greens'. Just think of them as the 'live' stuff. They are wet, mushy, and fresh - sometimes super smelly materials like kitchen scraps, freshly cut grass, and the leftovers from weeding minus the flower heads or seed pods.

You will need more browns than greens so if you've got access to leaves, whether it be those from your own yard or bags sitting on the curbside that is perfect. I always ask if it is okay to take someone's bags of leaves, as a point of courtesy. And just a heads up - Black Walnut, Oak, Poison Ivy & Sumac leaves need a great deal more time to break down, and they will have to be shredded very finely before being added to any compost pile. My best suggestion on those is to use them in hugelkultur (I'll touch on this briefly later on in the chapter) or compost them in a completely separate area of the garden. Needles from coniferous (needle carrying) trees are also the same, but they are very acidic in composition. They too, should be composted separately or used as mulch for acid loving plants like rhododendrons or blueberries.

You will need a great deal less greens than browns to build a compost pile in a rough ratio of 30 parts brown material to 1 part green. So if you have 30 inches of chopped up dead leaves or straw etc. (browns), for example, then you will need one inch of kitchen scraps or manure (greens) over top of it.

To build your compost pile you will need to gather any of the materials listed mentioned above.

Please use your common sense when trying to determine what you can compost. If it was made with a lot of chemicals, bleaches, synthetic anything – it's probably not something you should compost. Recycle maybe yes. But not something that you should introduce into your food chain via your soil. If it comes from your body you can probably compost it. If it comes from a box or a factory unless it's cardboard itself - just don't do it.

If it comes from your kitchen, the land, the forest, the trees, the plants, anything natural it's probably ok.

And of course... no glass, plastic, nothing chemically treated, nothing man made with color in it, no cans, bottles, nothing that you would send to a recycling station or landfill. Those things do not belong in a compost at all.

A Note about Grass:

As long as your lawn is not treated with chemicals such as herbicides and fertilizers you can also use your own cut grass to build your compost pile. If it is freshly cut, you can use it in small amounts in your compost pile as a green material. If it is left on the lawn to dry and gathered after drying, you can use it as a brown material in your compost pile. Make sure you mix it with

other materials in a similar state like straw or dried shredded leaves, otherwise it has a tendency to clump.

You can also simply use your grass as mulch over the surface of the soil in your garden, green or brown, it doesn't matter, just a thin layer of an inch or two over the soil, just make sure there are no weeds in it.

How to Build Your Compost Pile

Once you have chosen the location, and you know what bin setup you are going to use (if any) and you know what you are going to add to it, then the next step is to stack some thicker sticks on the ground in different directions right in the middle of where the pile is going to be built. This helps oxygen to get into the pile. You need oxygen within the pile to keep the air flowing and to assist the microorganisms in breaking everything down.

So the first layer I use is sticks. I stack them up about half a foot thick. You can make any shape you want as long as air can get into the middle of the pile. Don't worry too much about how high the pile of sticks is, they will get weighted down as you continue to add compost.

If you don't have sticks that you can gather, then it is not a big deal, you will simply have to spend a bit more time, maybe once a week or once every two weeks, mixing the pile to introduce oxygen into it.

An alternative to this is pretty easy too though... You can drill 1" holes all along the length of a 5" PVC pipe. Some hardware stores and specialty places sell perforated PVC drain pipe that already has the holes fabricated into it as well. Either way, take this pipe and set it straight on end and leave it vertical in the middle of your compost pile, building your pile up and around it. It will definitely keep oxygen rotating through your pile with little intervention on your part.

Here are key components that you need to know:

The smaller everything is that goes into your compost, the better. This helps all the little microorganisms to break the particles down faster, as the more surface area that is available to them, the quicker they can do their job.

I got into the habit of putting the bag on the lawnmower and running over the leaves, kitchen scraps and any other yard waste and dumping the entire contents right onto the compost pile as each bag became full. You can run the browns over and through first a couple times and then do the same with the greens. Or you can run all of it over and through together, essentially mixing them beforehand. The choice is yours.

On top of the base layer of sticks, I put down a layer of green material first as this helps to get things going. Then a layer of browns. Then greens. Then browns. Then greens again. Then browns. Try to remember the 30:1 ratio of browns to greens as you go. You will have a significant pile in no time.

Water, Moisture and Compost

Watering between layers of material that you add is not necessary but again it will help the process along. The most helpful point in time to water when you are building a compost pile is right after you put a layer of green material on top of a brown layer of material. When you water from above, the water will carry the tiny nutrients and the little microorganisms that the green layer has to offer right into the brown layer, kick starting both the organic and chemical reactions that cause the decomposition to begin. A quick 5 second shower of water over the green layer will do.

On the whole the moisture content of a compost pile should be no more than that of a wrung out sponge.

The Golden Rule of Composting: If your compost pile is too wet, it will begin to smell. If it is too dry, it will take a great deal of time to break down.

If your compost is out in the open without shelter, the spring rains should help it along as well. If you are building it while it is raining or on a day that you are expecting rain then there is no need to water. The snow in the winter time also offers moisture and if your compost pile is built in an optimal way, you might even notice steam coming from the pile in the middle of winter. The steam is due to the heat being created by the optimal decomposition conditions in your pile and the chemical reactions that are occurring. This has happened to me on several occasions, always leaving me feeling wonder and awe at this miracle that is happening right in front of me. It is truly wondrous.

If your pile begins to smell really bad this simply means that you have too much green stuff (nitrogen) and not enough brown stuff and/or the moisture in your compost pile is too high and the pile dynamics have gotten out of balance. So your pile is actively rotting, not really composting the way you need it to.

But, there are definitely a few things you can do about this.

If your compost pile is receiving too much moisture because of the climate you live in then you can cover it with plastic tarp or build a slanted roof to protect the compost pile somewhat so that less moisture gets into the pile.

The next thing you can do is aerate it, which means to add oxygen. The quickest and easiest way to do that is to take a garden hoe and pull a portion of the compost pile right out of your bin and spread it out on the ground for a day or two and let it dry out a bit.

Lastly and more labour intensive, you can pull the pile out and mix in a ton of straw and/or leaves that have been chopped up. This will absorb some of the smell and balance out the dynamics in the pile.

You CAN continue to add to your compost pile throughout the winter. Simply hang on to your leaves in the fall and create a temporary pile to add greens to somewhere in the yard. Then in

the spring, be prepared for bit of smelly fun and use both the greens pile and the leaves to build up the layers of a new compost pile.

What you can do with compost:

Side dress your plants – this means you sprinkle compost around them in a circle or around the sides of them. Over time, the compost and all of its life giving nutrients and minerals will be carried down into the soil feeding the roots of your plants using this method of soil amendment.

Use it as a mulch – Mulch basically means to cover or blanket the soil so that the only thing that is exposed are your plants. This prevents the evaporation of water and soil erosion, keeps weeds down and builds up the soil slowly over time. I enjoyed mulching with a thin layer of compost a couple inches thick and then finishing up by mulching heavily with leaves or straw. As long as the plants stems or stalks were exposed to air and sunlight right down at the soil level they were fine being mulched this way and thrived tremendously.

Make compost tea – you can easily throw a shovel full of compost into a bucket or a rain barrel if you have one. Stir really well and let it sit for a couple of days, stirring well once or twice a day. You can fill a watering can with this water and water your garden from above with it first thing in the morning making sure you get the leaves covered in water too as plants not only feed from the roots but also from the leaves.

Use it to cover seeds as you plant them – This gives your seeds a head start: as they sprout, the food they need to grow is right there for them to access.

Mix it very gently into the top inch or two of your existing soil.

Vermicomposting:

Another method of composting that adds biodiversity to the soil is composting with earthworms. The species of worms used in vermicomposting ([Eisenia fetida](#) or [Eisenia andrei](#)) are not typically found in deep in the soil or in the soil at all as they have adapted themselves to living between the surface of the soil and the underside of the decomposing layer of organic matter on the forest floor.

These babies are most likely not the ones you see around when you are digging in the dirt. They basically eat their way through and around anything, digesting and then excreting what they eat, leaving behind tiny pellets of dark brown nutrient dense little poop bombs technically called 'castings'.

These castings are collected and used exactly the same way as regular compost.

I have kept worms several times over the years and have given them away to friends and to all of my gardening students who wanted them.

And yes, I have even killed them multiple times by neglecting them and felt awful when that happened. Life has upon occasion, gotten in the way of staying on top of all of the responsibilities and obligations I have. I remember vividly digging carefully through a worm bin looking for any last little creatures left alive that I could save while crying angrily at my stupidity and carelessness. Not a lesson I care to revisit again.

But in regretfully sharing all of that.... I must tell you that even though I killed my worm babies, it was due to my neglect that they died, not because there is some particularly difficult aspect of keeping worms. Worms are very easy to care for.

The list of things that you can feed earthworms is a bit more expansive than the things that you can put into your compost pile outdoors. There are few things that worms will not eat and fewer things that they can be harmed by.

I read up a lot on vermicomposting. But, the most interesting thing that I discovered while on that journey was that most sources of info on vermicomposting say to use only fruit and vegetable kitchen scraps because of the smell that can happen when you add the other types of things that earthworms will most definitely eat – table scraps, left overs and even meat. There was no scientifically viable reason to exclude anything but fruits and vegetables.

Mary Apelhopf, the writer of “Worms Eat My Garbage”, would actually save up table scraps, veggie and fruit peelings and coffee grinds throughout the day. In the evening she would wrap them up in newspaper like a little parcel and place them strategically in her worm bin side by side in order, in a grid like pattern. Her little food parcels also contained meat bones and those worms ate every particle that was not bone.

This actually makes complete sense, for in nature, earth worms totally eat whatever biological food sources are available to them, including any manure or rotting carcass that ends up on the forest floor. I could imagine if science examined this fully, their castings would likely be, just that much more nutritionally dense.

Between composting and vermicomposting, the amount of organic material going to the landfills if any previous, will be drastically reduced.

All you need is a worm bin, worms, kitchen waste and newspaper.

There are many designs for bins - the movement on vermicomposting has people building what they call ‘worm condos’ and stackable systems that can be easily expanded. Some systems include a catchment system for the liquid that is produced from vermicomposting, or ones where there are separate compartments for new and older castings. I will share some pictures here as well.

Just a heads up... It is rare for worms to attempt to migrate out of their bin. If they do then there is something wrong in their environment - either it is too wet or there is a food in the bin that they are bothered by. Worms will stay in their bin if it is humid not wet and there is an ample supply of food for them. There IS something in the peels of the citrus family – oranges, lemons, limes and also onions that they don’t like so I suggest you save those for your outdoor compost bin.

A container with a lid is important. Wood is THE best material to build it out of. Deep Rubbermaid type containers that have solid sides also work well: the worms like a dark deep space, so clear containers will not work well for this. It is very important to wash them out well with soap and let the plastic breathe for a couple of days. The chemical smell leaching out from the plastic is not a good thing for the worms. I have had containers where I've drilled holes in a strip around the top lip of the bin a couple of inches apart all the way around to provide more air flow for them to keep down the smell and help the worms to breathe. You can cut pieces of plastic screening or even cloth and glue them down with a hot glue gun over top of the holes from the inside of the bin so the worm bin is aerated but the worms can't get out. I have also had containers where I've simply drilled many holes in the lid.

To get their new home ready for them, they need 'bedding' to crawl around in. It keeps the smell down, gives the worm a neutral medium to eat and it also helps to have the bottom of your bin covered for cleaning purposes later.

Good 'bedding' material retains moisture, has no sharp edges or abrasive qualities that could hurt the worms, allow oxygen flow and be PH neutral (not acidic or alkaline).

You could use any one or a mixture of the following:

Shredded brown cardboard	Coco coir
Shredded paper (not bleached white office paper)	Peat moss
Shredded newspaper (not colored)	Straw and hay
Aged compost	Fall leaves and other yard waste
Aged horse or cow manure	Wood chips

My personal preference because there is a lot of it around and it is easily accessible, is newspaper. No glossy stuff, nothing shiny as that is harmful for the worms. But, the black and white sections work well.

So grab a stack of newspapers and begin shredding them.

A paper shredder here is very helpful, as the more eating surfaces you can make available to them, the faster the worms will do their job.

If you don't have a shredder and you are working with newspaper, the thinnest strips of paper can be made when you refold the paper up completely to its original state. Take the main fold that is on the front of the paper in one hand very close to the cut edge of the paper. Take the thumb and finger of the other hand and pinch the edge of the paper between them and pull down.

I throw whatever I've shredded into the worm bin while setting it up for the first time. You can throw it into a garbage bag, or make a bit of a mess on a tarp or on bare floor. Shredded paper isn't hard to clean up.

If you don't have a lot of hand strength you can unfold it and start at the top or even shred the pages one at a time.

Once you have a decent enough pile of shredded newspaper, toss the paper around with your hands to separate it all into individual pieces and place it in the bottom of the worm bin. At this point you can either spray it down with warm water from a spray bottle or sprinkle water over it. Either way, spray or sprinkle and mix it as you go. It will take a day or two for the newspaper to be completely absorb all the water throughout unless you saturate it a great deal. You don't want to water it too much though because you will be adding material that is 'wet' already, in the form of food scraps. Too much moisture in the beginning will result in puddles forming at the bottom of your bin.

The end goal for moisture with earthworm bedding is the same as outdoor compost: moist like a wrung out sponge.

The prepared worm bedding should be at least one foot deep before you get started with the next step.

Once you have the bedding setup, you can begin adding food. I like to spoil my worms and run their first meal through a blender or chop it as fine as I can manage. The sooner they can eat once they are in the bin the sooner the stress of being moved will ease. I typically spread the food out over one end of the bin. Then I pull a skinny layer of moist bedding over top of their food. Then I add the Earthworms and pull a great deal of the bedding over top of them. And then I leave them.

I check on them every day to say hi to them and check up on their progress.

If I notice that there is condensation on the inside of the lid, I will take the lid off for the day while home to help their environment dry out a bit. I can also add more shredded newspaper that will absorb more moisture from the environment inside their home.

I save up scraps while they are eating the first batch of food I have given them. Once I have a second batch ready for them, I place that batch of food alongside the first. They will slowly migrate into that new pile leaving behind all their worm castings for you to eventually harvest. You can continue to add food scraps in such a manner all the way to the end of the bin. By the time you are adding food to the last row in the bin the first row should be ready for harvest, just be sure to check for cocoons or live worms before you go to use it.

And here is another cool thing about these worms. They will reproduce or die off according to how much or how little food is available to them.

If you feed them quite a bit, they will reproduce like crazy to deal with the amount of food offered. You might find tiny little grain looking pods in your bin, roughly the color of lemon pulp or blood orange pulp and the shape of a tear or a lemon depending how many eggs are in this little cocoon. This is, of course an Earthworm cocoon containing up to 20 Earthworm eggs. Only some of those eggs actually survive and hatch into baby wrigglers.

If they don't get fed very much or very often, the likelihood of them producing cocoons in abundance isn't very high.

If you stick to a graduated feeding program of adding your food scraps to the bin once or twice a week, and eventually every day, you will have a whole bunch of worms, cocoons and an abundance of nutrient dense worm castings in no time at all.

You can use worm castings in exactly the same manner as regular compost.

A Special Note: How to Separate Earthworms from their Castings:

Worms that are in a good state will typically come with some food that they are working through like bran and vegetable and fruit scraps. You will probably be able to see the food clearly in their container. If everything in their container has been consumed you will know by everything except the worms in the container being brownish black. This is their castings. It is possible that they might have been in their container or bag for too long, or they weren't given enough food to feed all of them. In the end it doesn't matter why, but you need to get your worms out of that environment before they die. Worms cannot eat their castings over and over again. They need food and bedding to eat through. You must separate them from their castings before you add them to their new home.

The most recent batch of worms I was working with came to me in a lot of trouble. When I picked them up they had been living in way too much of their own castings for far too long and some worms in the bag had already died. Worms need their castings removed from their habitat or they will die. These worms are very sensitive to toxicity. They are meant to eat new material constantly, not their own castings over and over.

So when I first got them home I had to separate them from their own castings. There was more than half a pound of them in this huge 5L bag of castings (poop) that needed to be rescued.

Even though the process of separating worms from their castings is a long one, it's worth it if they need it and its worthwhile knowing how to do. By the time you are finished you will have a large handful or two (or more) of earthworms, a pile of worm baby cocoons and a whole bunch of wonderful worm castings that you are free to use as you see fit.

This is how you do that.

- You will need one of the following to cover your floor or table or wherever you are going to do this: either a small tarp, or a plastic shower curtain or 8 or so full sheets of newspaper that have been opened completely and arranged into a rectangular shape (the floor has always worked best for me for this)
- A small table lamp (if you have one)
- Your bag of worms.
- A container for cocoons.
- Lots of patience and time.
- Their new worm bin home, ready to go with moist-like-a-wrung-out-sponge bedding and food readily available.

Gather all of your materials. Prepare the bin. Cover your working surface. Get your container and table lamp set up. Take your bag of worms and oh so gently and carefully, pour them out into the middle of your working surface in as nice and as neat of a pile as you can manage. Tidy

the area if it got out of control when pouring out the contents of bag or container by slowly and carefully lifting up the edges of the paper, tarp or shower curtain.

You are basically going to be making a mini mountain.

If you have a table lamp you will be cutting your time here in half. These worm babies shy away from light. If you just have natural daylight, they will migrate away from the outer edges of this mini hill that you have made and into the middle of the pile, it will just take them a bit longer than if there was a table lamp shining right at the pile.

So you can wait twenty minutes or so with only natural light. Or you can turn the lamp on and point it from above the pile a foot or two away and wait ten minutes.

I like using a timer to keep tabs on the time.

When it's time, remove the outside edges or layer of castings from the pile by carefully scooping them away being cautious not to hurt or squish or swipe any worms too hard. This is a slow process, progressing handful by handful. If you find any worms or egg cocoons in your hand, make a separate pile for the cocoons away from the hill and place the worms on top of the pile so they can crawl back in. The cocoons should be put to the side as those sweet little bubkyns are really easy to lose during the process.

The castings can go into a pan or that your worms came from.

Then you set the timer all over again. And wait until they migrate further into the middle of the pile some more. Then pull away the outer layer of the mini hill again, putting back into the pile whatever worms you find, and removing to the side any egg cocoons you discover.

As the process comes along and more and more castings are removed from the worms you will start to see this little mountain moving... All that will eventually be left of this mountain is worms and very little castings.

Once you have removed most of the castings and cocoons, you can very carefully pick up the pile of worms or even the surface that they are on and place them in their new home. The cocoons go in there as well. Add new food – this is where I like to run their food through a blender for them and pour/place it just beside them. Cover them well with fresh bedding.

The first time I did this I used a lamp. It took two hours and I was separating half a pound of worms from their castings.

The second time I used natural light and it took over four hours in between house chores and laundry to separate a pound of worms from their castings.

It was totally worth it.

Two weeks now after I've separated this second batch from their castings they are doing very well in their new home. There are so many cocoons and an unbelievable amount of castings already.

Worms are a wonderful helper in both cutting down on the amount of waste going to the landfill AND creating an amazing material that will serve your plants and in turn you very, very well.

Soil & Soil Amendments:

Adding organic matter to your soil is one of the best ways to build it up, ensuring its replenishment and the production of the most nutrient dense food possible. You are creating ecosystems when you compost or compost with worms - the combination of all of these organisms and microorganisms are exactly what the earth needs thrive.

Adding peat moss to the soil assists in avoiding soil compaction and helps the soil to retain moisture. But, peat moss is quickly becoming a scarce commodity as it comes from peat bogs so please keep that in mind. Clean river washed sand provides drainage if needed. I used to use both vermiculite and perlite in my garden, but I didn't realize that both additives require extensive mining and processing before use and are actually unnecessary if you use organic materials in your soil like pine cones, coffee grounds and leaves and especially and more than anything, compost and vermicompost.

Those two are the most well rounded additives you could offer to your plants.

Sometimes certain soils or plants need more of one mineral or nutrient or other. Here is a quick run-down of some of those nutrients and what they do:

Primary Nutrients

- Nitrogen (N) - Creates green, healthy leaves. Vital for plant growth. Sources:
- Phosphorus (P) - Creates strong root systems. Promotes early root formation and growth. Improves quality of fruits, vegetables, and grains. Vital to seed formation. Helps plants survive harsh winter conditions. Increases water-use efficiency. Hastens maturity. Sources:
- Potassium (K) - Potassium creates robust, healthy growth. Improves quality of seeds and fruit. Improves winter hardiness. Increases disease resistance. Sources:

Secondary Nutrients

- Sulfur (S) - Aids in seed production. Sources:
- Calcium (Ca) - Increases fruit set. Sources:
- Magnesium (Mg) - Influences earliness and uniformity of maturity. Sources:

Micronutrients

- Zinc (Zn) - Aids in seed formation. Sources:
- Iron (Fe) - Reactions involving cell division and growth. Sources:

- Copper (Cu) - Intensifies color. Improves flavor of fruits and vegetables. Sources:
- Manganese (Mn) - Aids in chlorophyll synthesis. Sources:
- Boron (B) - Essential for seed and cell wall formation. Promotes maturity. Sources:
- Chlorine (Cl) - Enhances maturity of small grains on some soils. Sources:

There is a great article I found written for Mother Earth News that covers the above in greater detail and provides natural sources of these nutrients. It is available on the Growing Empowered website here: <http://www.growingempowered.org/restoring-soil-nutrients/>

Here are a few other things I've done in my garden that have always served me well:

- Banana peels in tomato planting holes provide potassium. I've often saved all my peels in the freezer after cutting them up into 1" pieces. Whenever I'm getting ready to use them, I take them out the night or day before planting and defrost them. I put three to five in each hole depending on what I have on hand.
- Epsom salts sprinkled around the garden at random provide magnesium.
- Save up meat bones and shells from shrimp, crab, lobster (if you eat them or can get them). Burn them in a fire. Take the ash once the fire has died out and sprinkle that around the garden. Adds vital nutrients and minerals.
- Throw some nettle and or comfrey into your rain barrel (we will get into gathering rain in a later chapter), stir daily. Let it rot for two weeks. Feed your garden with the water in the barrel any time after that. You can add a least two or three entire stalks of either or both plants but take precautions when you pick nettle by wearing gloves and a long sleeved shirt and long pants. Nettle stings the skin and it burns for some time after you've touched it. Compost what is left at the bottom of your rain barrel when it is empty. This is a total tonic for your plants. They love it.
- Eggshells - Wash freshly used eggshells in cold water, rinsing off the egg yolk or whites. Dry in an oven at a very low temperature of 150-200°F. When completely dried, throw shells in a paper bag and crush them with a rolling pin till the shells are pulverized. Or better yet, run through a blender or food processor till powdered. This adds calcium to the soil.
- If you can get your hands on it, you can add seaweed to your rain barrel, stir daily and let it rot for preferably at least two weeks. You can feed your garden with this anytime after those two weeks are up. Compost whatever is left at the bottom of your rain barrel when it is empty.
- If the soil you are planting in is on the acidic side due to say, an abundance of pine needles for example, then you can have a few bonfires in the back yard, create a whole bunch of wood ash and sprinkle that all over your garden. This will neutralize the acidity of the soil. Neutral pH is exactly what you want unless you're growing acid loving plants like blueberries, rhododendrons or roses. Please make sure however, that the wood you're burning is not refuse from a building project, for example and that it has been pressure treated. Ashes from natural hard or softwood is what you want to burn.
- I know this one might be offensive to some, but I'm going to share it anyways. I read somewhere once that one could use menstrual blood to feed the soil and in turn the plants. This is very powerful medicine for your garden. I have my own 'moon pad's'- actual period pads that I've sewn and used myself. I found patterns on the internet and

made them out of layers of cotton flannelette, strips of corduroy on the underside so they don't slide around and snap buttons. I had a lidded bucket in the bathroom that had water with a little bit of baking soda and hydrogen peroxide mixed in. I put them in there after using. Once it was full I'd remove the used pads, squeeze them out and pour the water into my very full rain barrel and water the entire garden with the diluted solution all in one shot. And the impact on the garden was stunning. The plants loved it. Everything I grew that summer was strong, lush, highly productive and very hardy. Just a heads up.

Lasagna Gardening

Lasagna gardening. What it is/means is exactly as it sounds.

You create layers of materials. And then you transplant your seedling babies or direct sow right into it.

I used to till. I've double dug garden beds. But, no more!

Lasagna gardening completely altered my approach in how I collaborated with the Earth. Instead of digging into it, or tearing it up and apart en masse I began supporting the Earth instead.

This is the easiest and fastest way I have discovered to create a garden bed without a ton of work. The end result is soft, healthy soil that plants love. It heats up faster in the spring because it is slightly raised and if weeds do happen to get into your lasagna beds they are incredibly easy to pull.

You only need a couple of things to build a lasagna bed...

- Cardboard and/or newspaper in large amounts. Cardboard does double duty in comparison to newspaper, so if you are going to lasagna garden with newspaper you will need a lot of it. And again, no color or glossy shine in the newspaper. Either paper product needs to be as natural as possible.
- Identical to composting, you will need browns and greens. And any other little extra amendments you want to add for vibrant, healthy soil like compost, vermicompost, powdered eggshells, coffee grounds, Epsom salts, wood ash, etc. You don't need a lot of it either. My favorite things to use to build a lasagna garden bed are manure and straw - not hay as this often has seeds and/or weeds in it that can cause a bit of work for you later- but straw. Straw is also smaller in length and easier to work with.

You will be layering these materials, in a sheet type formation to create a lasagna bed of awesome materials that your plants will love.

You can commit to lasagna gardening right on your bare lawn. There is no requirement to pull up sod or grass or peel everything back to bare soil. Some people like to cut the sod into strips or squares and flip them over before they begin layering.

I've lasagna gardened after flipping and I've done it without flipping. If you have enough cardboard or newspaper, flipping is unnecessary work.

Your first layer IS very important though regardless of what you're going to use to build these lasagna layers. The first layer is going to smother whatever you're building the lasagna bed on top of. Overtime it will decompose and feed whatever roots are growing down into it.

Stake out where you want to build your lasagna garden. Gather your materials. I like to gather everything on a tarp to try and keep things tidy.

When using cardboard, one to two layers will do. You will need all of the tape and/or staples removed. You are going for a bare sheet of cardboard. When using newspaper, you will need quite a few sheets stacked on top of one another. Some people say 8 sheets at a time. Others say 10.

With either or both materials, cover the area you want to build a garden on, completely overlapping the edges by a minimum of six inches. I have often overlapped edges by a foot (12 inches).

I saw a new idea pop up at this stage of the process recently. People decided to mark out their gardening space, cover it with the cardboard and/or newspaper and THEN move a raised bed frame over top of this space and strategically place it so their lawn would be smothered right to the edges of the lasagna garden. At that point they would continue on layering their lasagna bed.

Whatever works for you, and makes you happy and your life easier is awesome.

Water the cardboard or newspaper very well at this point. Now comes the fun.

You will be spreading the material for each layer as evenly as you can over the entire area.

Here is how you can layer it up:

- Throw down a sprinkle of manure. Maybe an inch worth – to the depth of your first thumb joint from the tip of your thumb.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- After the manure, a 12 inch deep layer of straw. It doesn't have to be compacted. It just has to be roughly a foot deep.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- Then again, an inch of manure.
- Mist thoroughly with a garden hose or shower lightly with a watering can.

- And then a broad sprinkle of those other amendments you've gathered – coffee grounds, egg shells, wood ash, etc. just a sprinkle like you would cinnamon in coffee, or icing sugar on a cake.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- Another foot of straw again.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- Another inch of manure.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- A sprinkle of amendments.
- Mist thoroughly with a garden hose or shower lightly with a watering can.
- Another foot of straw.
- Mist thoroughly with a garden hose or shower lightly with a watering can.

And here is where you can close the layering off with a final inch of manure or even plain soil if you have it.

I know it might sound or seem intimidating or complicated. It was for me in my head when I set out to do it the first time. But, three layers in, me and my boys were having so much fun throwing the materials over the area, that I ended up simply enjoying the moment and trusting the process and before we knew it, we had built a lasagna bed.

By the time you are finished, you will have a lasagna garden bed that is over three feet deep. You can direct sow or transplant seedlings straight into this bed as soon as it is finished.

If you have built your garden bed in the spring, by the time fall comes around, it should have cooled down and decomposed to a depth of roughly a foot and a half. If you save up more materials over the spring and summer, you can follow the above procedure and build up the layers again over top of the existing bed in the fall and leave it to rest over the winter to plant it again in the spring. Or you could direct sow the hardier crops (spinach, beets, swiss chard, kale, beans etc.) right before winter comes so they will come up earlier in the spring when they know it's safe to emerge.

Humanure... It Makes Sense

Something else that I came across on my journey really blew my mind wide open.

It created a new line and depth of questioning and thought that I hadn't considered at all in any of my travels...:

Our physical bodies, in essence, came from the Earth. Yes, we are comprised of atoms and matter that is found across the entire Galactic Universe. And yes, our mothers carried us, but what they took in from this Earth is what formed us. They needed what the Earth had to offer to create us, to carry us along in our development and give birth to us.

If they wouldn't have eaten food, breathed the air or drank water, we would have died.

Our bodies were literally formed from the life giving systems that still exist on this planet.

And then I wondered on about what it had been like millennia ago...

I imagined that when we died our bodies were put back to the earth. Buried. Or cremated. Or left on the surface of the earth.

And as our bodies decomposed, the Earth took us back – skin, cartilage, muscle, bone, hair, teeth, all our insides... The Earth took us back through its amazing biological processes.

All of that seemed like it was once a very natural process.

Then I went down the road of wondering about all that went into us and the making of our bodies. The food humans once consumed. And everything we now consume. How different food is now compared to what it once was... And how the more natural and raw our food is, the healthier we are. And how we need to get back to that natural place.

And then I thought about how it comes out and how most of this 'civilized' world deals with that.

And that is where I got stuck... we defecate in our drinking water.

Why do we put our human waste in water? In potable (drinkable) water no less? Why do we deposit our human waste into drinkable water?

Water is such a precious thing. It is a finite commodity. Once we have utilized or contaminated it all, it will be gone. It is not a renewable resource. There are ways to gather it from the sky sure. But the water within our aquifers and within our oceans is super important to all life on this planet. Not just humans.

Keeping that in mind, it makes little sense to deposit our human waste into drinking water and flush it.

And it was this line of thinking that encouraged my openness to the ideas of people out there who have discovered solutions to this problem. Through their ingenuity and innovation they have chosen to no longer contribute their human waste to any of the water systems that exist on this planet. And they don't.

They have studied the science of composting human waste, wrote books on it after doing it themselves for decades, describing the reduction and eventual non-existence of pathogens within the finished product and what they use it for.

One such book is 'Humanure' by Joseph Jenkins.

This gentleman has been composting the human waste produced by his family since 1979.

For over 36 years at the time of this writing.

Within his book are detailed descriptions of how he carried this out, what his discoveries were and the outcomes.

I actually decided to try this with a very brave friend of mine who lived a couple of doors down from us when we lived out in the country. We both used 5 gallon pails and shared a bag of pine wood shavings between us. Both of us had kids, but funny enough, none of our kids would participate as it was just the pails we were using, no actual toilet seat was involved haha. We used it for a week in our own bathrooms and compiled the contents of the buckets at a discreet location in the back of the yard when the week was over. We put a small amount of wood shavings in the bucket first. And whenever we went to the bathroom, we just threw a scoop of additional shavings on top and left it like that till next time. And we continued on this way until the buckets were full.

It didn't smell on the whole. When we actually used the buckets, there was little difference in comparison to a traditional flush toilet, smell-wise. The only thing I noticed was when I threw a scoop of shavings into the bucket, the smell was snuffed out by the fresh pine smell. And that was awesome. Kind of reminded me of being in bathrooms where people keep matches to get rid of any smells.

But, having the bucket in the bathroom did not make the bathroom or the house smell like an outhouse. And the contents of the bucket was left to decompose for almost a year before I used it in my garden. No smell. No issues.

The problem with precious water resources being used as a carrier for human waste is an urgent one.

Composting human waste is a solution.

Please consider it.

Biodynamic (BD) Preparations

This piece is uncharted territory for me. I have not had the opportunity or the land to do this yet since I came across biodynamics.

So I offer this little bit with you in a spirit of sharing, hoping you will look into this more as I really think there are solutions to be had for all in biodynamics.

In trying to uncover the difference between biodynamics and permaculture, I recently read through an online philosophical debate on both and from what I was able to understand, permaculture is based in science and biodynamics is science with holistics and spirituality mixed in. There isn't a clear understanding out there on why it works that I have been able to find. Lots of theories, lots of intuiting. But, from what I could gather, human beings haven't been able to clearly define the hows and the whys.

I have done more research on biodynamics than I have permaculture. Biodynamics crossed my path first with the reading of "The Secret Life of Plants" and then "Secrets of the Soil" by Christopher Bird and Peter Tompkins.

I will repeat myself and say that both books are must reads to truly round out one's knowledge base about connecting with the Earth and creating a deeper understanding about our relationship to the Natural World that we live in.

I have read both from cover to cover. There is wisdom within the pages of both that must not be ignored.

The stories I have read on the impact that biodynamic preparations have had on plants, growing environments and the land are beyond remarkable. They will goosebump you and leave you in awe.

Those who have been practicing this method of working with the land and the food that they grow for decades, have said that many people have been approaching biodynamics from a somewhat 'sterilized' stance - their minds/brains are involved but not their hearts. I can imagine that a full-on involvement with it would not only help our plants and the land, but also us.

Biodynamics works. There are thousands of growers and farmers all over the world using it, there are organizations who teach it and sell the BD preparations, and there are even formal institutions that 'certify' BD users and their commercial farms. Just a quick search on the internet using different terms can bring a lot of information right to your fingertips.

But, biodynamics involves not just the labour from our hands to engage, but our heart and spirit as well to connect with the land.

I will give you the basics of biodynamic preparations here. If you want/need further knowledge on this you can find pdf's of both "The Secret Life of Plants" and "Secrets of the Soil" on the Growing Empowered website here: <http://www.growingempowered.org/must-have-literary-resources/>.

"The Secret Life of Plants" pdf is beautiful. Someone out there created a pdf of the entire book and I am extremely happy with it.

"Secrets of the Soil" however, was scanned in laboriously page by page and uploaded in three parts by someone out there who thought this book was important enough to do this with. I was able to take all three parts, download them and merge them together into one document so people could at least have it on hand, electronically and otherwise if it was printed off.

I do have to say though that the scanning job isn't as awesome as I'd hoped, so you may have to zoom in and take your time reading it.

The instructions on BD Preparations begins on page 377 of the pdf for "Secrets of the Soil"

I took the time to put together a comprehensive chart after gathering info on the BD Preparations from multiple sources. You can find this on the next page after the following instructions on how to build a biodynamic compost pile.

Everything after this point is taken from the Appendix of "Secrets of the Soil".

How to Make a Biodynamic Compost Pile

Start with digging a 4-5' wide by 6' long (or longer) trough of soil loosened and dug down to a depth of about 8". Must be sited on well drained, partly shaded ground – must not be directly in the sun. Long sides should be oriented north-south so that both finished sides receive equal amounts of sunlight to ensure even fermentation.

Pile should be built up to about 4-5 feet high, narrowing toward the top. It is constructed in layers with each layer being sprayed with a fine spray of valerian steeped water. The first layer should be made of twigs, about 0.5" in diameter to ensure good drainage. (Any materials after the twig layer should be chopped or shredded if fast fermentation is required).

Then an 8" layer of hay, weeds, and fresh garden debris.

Next a layer of manure – cow, horse, chicken etc. If manure is lacking use good old compost instead.

Layers of soil should not be more than an inch or so thick. Layers of leaves and grass should be less than 2" thick so as not to compact.

Another layer of fresh green materials can follow: cut grass, weeds, kitchen wastes such as tea leaves, coffee grounds, vegetable trimmings, meat and fish scraps, floor sweepings, vacuum-cleaner contents, old woolen goods, and even old sacks. Dried blood, hoof or horn meal, and pea and bean waste can also be added.

Then add another layer of manure and so on.

If adding lime to the pile, only a small sprinkle of dolomitic lime is recommended.

When the pile is 4-5 feet high, finish it off with sides sloping at an angle of 70 degrees until it is two feet wide at the top.

Inserting the BD Preparations

Take a bar or broom handle and make six holes in the sloping sides (three on each side) twenty inches deep about 6 or 8 inches down from the top and spaces equally apart. Into five of these holes insert a pinch, or better still a pellet, of each of the preparations 502-506. Each must go into its own hole, with no mixing. Cover the five holes. (With one complete set of preparations, the most that can be treated is a 15 ton pile).

Stir twenty drops of valerian juice (BD Preparation 507) into one gallon of lukewarm rainwater, or good quality water, alternating one way and then the other, for twenty minutes, as with BD 500 & 501.

Divide the gallon in half. Pour one half into the sixth hole. Spray the remainder in a fine mist from a clean sprayer over the entire pile.

Finally, for protection against the sun and against too much rain, cover the pile with an inch or two of straw or peat moss and a burlap bag.

The finished pile should remain moist at all times, holding water like a damp sponge, but not accumulating water so that it runs out or collects at the bottom. Each fibre should be almost shining wet.

In the new pile an enormous growth and increase in the activity of micro-organisms will begin. Their metabolism yields heat, which will develop in the first three days up to a temperature of 150 degrees or more.

It will need to be monitored carefully so that it breaks down at the right temperature. The best temperatures are 120-140 degrees. A higher moisture content keeps the temperature lower. If the pile falls to half its size during the first few days, too much air has entered and it has burned like a bonfire.

To reduce heat, make crowbar holes all over the pile to let in air, and dry it out. A gray mold indicates too much heat. To cool the pile, turn the hose into the pile for a while. After a few days close the holes.

A pile will cool off in fifteen to twenty-one days. If it is turned, so that the top is on the bottom, and the inside is on the outside, it will heat up for another fourteen days. But a pile in the proper condition from the start will not need turning.

Earthworms are a good sign of progress.

Three stages take place before the pile becomes humus (awesome compost!):

- The original smell disappears and the material takes on a woody odor. This may happen in only a few days.
- The color becomes uniformly dark brown.
- The original texture disappears and the pile looks like rich soil.

Best results are obtained from the finished product in about two or three months. Ripened compost will keep for several months with protection from sun and drying winds and with sufficient moisture.

If used before stage three, do not plow under, but mix with topsoil so the air continues to have access.

A second pile built on the same compost pile foundation as the first will generally do better and have even more earthworms; they will stay in the ground and invade the next pile.

Compost is applied in the spring and fall to provide a high number of living organisms to the soil with each shovelful of compost.

In the garden, you can work it gently into the top 2-4" of surface layer, or put it into seeding or planting holes.

For crops on the farm, it is gently worked in to the surface as well or broadcast on grasses and hayfields. It should not be dug in deeply, but spread by shovel or muck spreader and worked into the soil with a rake, cultivator, or disc harrow.

Biodynamic Preparations Chart

Biodynamic Preparation	Ingredients	Process/Timing for Creating Preparations	Mode of Application & Procedure for Using BDP's	Purpose and Timing for Application
500	Extremely fresh (1 day old) cow manure packed into a cows horn.	Bury 2 feet down in the soil in the fall. Leave over winter.	For one acre of land, stir 1.5 oz. (35g) of BD 500 into 4 gal of rain water. Stir clockwise and counter clockwise for 20 seconds in each direction, for one hour. Apply within 3 hours of completing stirring. Sprayed on soil typically at a rate of 60g/ha in 34 litres of water.	Stimulates root growth in plants. Helps strengthen root development of those fields that have suffered from frost or wind erosion. Sprayed often in spring ahead of planting.
501	Finely ground quartz crystal, mixed with rainwater, packed into a cows horn.	Bury at the beginning of summer. Dig up in early fall. Store in glass jar in sunny window.	For one acre of land, stir 1/20 oz. (1-1.5g) into 4-5 gal of rain water. Stir clockwise and counter clockwise for 20 seconds in each direction, for one hour. Stir for one hour and then spray on a fine mist setting on all crops.	Helps to bring sunlight to the leaves of plants. Stimulates photosynthesis and structural strength of plants. Applied in late spring/early summer during early morning hours on a warm and at least partly sunny day.
502	Fresh yarrow (Achillea millefolium) heads packed into a stag's bladder.	Harvest yarrow heads in spring or early summer. Dry them. Make a small amount of tea with some of the flowers. Moisten the rest of the yarrow heads with the tea. Stuff all of it into the moistened bladder of a male deer, elk or moose. Sew bladder shut and hang in the sun six feet above ground in a position of direct sunlight. In the fall, bury the bladder 10-12" deep in the soil. Leave for one year in the ground.	Biodynamic preparations 502-507 are added to biodynamic compost pile. BDP's 502-507 control the breakdown of the manures and compost.	Enhances plants ability to absorb potassium in a balanced manner. Enables the soil to absorb and retain fine doses of silicic acid. Aids in the formation of quality plant protein. Provides Sulphur and Potassium. Provides trace elements for uptake in dilute quantities.
503	Fresh chamomile (Matricaria sp.) flower heads fermented in soil.	Harvest wildflowers early in the year when they blossom. Dry in the shade and store once dry. In the fall, moisten the leaves well in some chamomile tea (1 tsp. flowers to one cup of water) Stuff the flowers into the intestines of a freshly killed cow. Bury in late fall. Dig up in the spring.		Works on calcium and potash and supports plant health. Stimulates plant growth. Provides Calcium and Nitrogen. Stabilizes nitrogen in the compost and enhances soil life.
504	Stinging nettle (Urtica sp.) tea.	Pick as many nettles as possible before they flower in June/July. Let the plants wilt slightly. Bury as they are and mark spot where buried. Leave for one year and into the fall (15-16 months after burying). Will turn into a dark humus.		Enhances plants ability to absorb iron. Helps adapt the soil to the particular plants growing in it. Provides Iron and Magnesium. Stimulates soil health providing plants with individual nutritional components needed. Is also sometimes sprayed on weak or low-vigor plants.

505	Oak (<i>Quercus</i> sp.) bark packed into the skull of a domestic animal (preferably sheep).	Break oak bark into very small pieces. Fill skull with oak bark. Close the opening with a piece of bone from the same animal. Bury just before winter hits, not too deep, in soil where water has access and cover with peat moss. If no access to water is available, place skull in barrel with decaying plant substance exposed to rainwater (you could use nettle or comfrey). A slimy, rotting mulch is the objective for this preparation.		Enhances the plant's ability to absorb calcium from the surrounding soil. Extremely high in Calcium and beneficial microorganisms. Provides plants with the strength to combat and prevent diseases.
506	Dandelion (<i>Taraxacum officinale</i>) flower heads packed into cow mesentery.	Collect flowers early in the morning just prior to flower heads opening. Let them fade slightly or dry them, keeping them in a cool place until the beginning of October, preferably covering them with peat moss. The mesentery MUST be in perfect condition, no holes or damaged parts. Flowers must be pressed tightly together to fill mesentery. Take care not to break the tender material of the mesentery. Tie around the mesentery with string to support it. Bury 12" down in the late fall. Dig up in the spring.		Supports the plants ability to absorb silica from the surrounding environment and brings it into a balanced relationship with calcium. Provides Silica. Stimulates relationship between silica and potassium.
507	Extract from valerian (<i>Valeriana officinalis</i>) flowers	Collect flower heads in spring, trim stems off. Place flowers in lukewarm water, let soak for a short while and then squeeze out well to make concentrated tincture. Some use a hydraulic press to extract liquid from the flowers.		Provides Phosphorus. Stimulates compost for proper phosphorus use by the soil. Warmth giver. Sometimes used in the spring as a spray to protect against late frosts.
508	Horsetail (<i>Equisetum arvense</i>) tea	Collect and dry as quickly as possible by spreading in a thin layer in a shady place until brittle.	Add 4 oz. of herb to 1 gal of water. Boil slowly. Strain and use as a spray.	Counters fungal diseases – mildew, rust, monilia, scab, soil-borne pathogenic fungi – on garden crops. Use frequently as a preventative. Treat cold frames, hot beds and greenhouses before and after being filled with soil. Can also be used as a root dip and tree spray.

2 recipes for Tree Paste. These mixtures are used to heal damaged bark on the trunks and branches of trees. The bark should be scraped and brushed clean to remove dead, loose parts before treatment. Trunks and branches which have received this treatment become smooth and clean, and the tree grows healthy.

Recipe 1: Equal parts of Stinging nettle humus, fine clay and VERY fresh cow manure.

Recipe 2: Equal parts of fine loam type clay and very fresh cow manure. Thin this mixture down with Horsetail Tea and a small amount of stirred BDP 500 until the mixture can be painted on the bark with a brush.

WHAT CAN YOU COMPOST? MIX?

Paper napkins	Grapefruit rinds	Sunday comics	Moldy cheese
Freezer-burned vegetables	Pea vines	Harbor mud	Greensand
Burlap coffee bags	Houseplant trimmings	Felt waste	Straw
Felt hair	Old pasta	Wheat straw	Shredded cardboard
Polish rags	Grape wastes	Peat moss	Dolomite lime
Post-it notes	Garden soil	Kleenex tissues	Cover crops
Freezer-burned fruit	Powdered/ground phosphate rock	Milk (in small amounts)	Quail eggs (OK, I needed a 'G' word)
Wood chips	Comcobs (takes a long time to decompose)	Soy milk	Rapeseed meal
Lint from behind refrigerator	Jell-O (gelatin)	Tree bark	Bat guano
Hay	Blood meal	Starfish (dead ones!)	Fish scraps
Popcorn	Winery wastes	Melted ice cream	Tea bags (black and herbal)
Freezer-burned fish	Spanish moss	Flower petals	Apple cores
Old spices	Limestone	Pumpkin seeds	Electric razor trimmings
Fine needles	Fish meal	Q-tips (cotton swabs: cardboard, not plastic sticks)	Kitchen wastes
Leaves	Aquarium plants	Expired flower arrangements	Outdated yogurt
Matches (paper or wood)	Beet wastes	Elmer's glue	Toenail clippings
Seaweed and kelp	Pencil shavings	Blood fish skin	Shrimp shells
Hops	Wool socks	Bone meal	Crab shells
Chicken manure	Artichoke leaves	Citrus wastes	Lobster shells
Leather dust	Leather watch bands	Stale potato chips	Pie crust
Old, dried up and faded herbs	Fruit salad	Rhubarb stems	Leather wallets
Bird cage cleanings	Tossed salad (now THERE'S tossing it!)	Old leather gardening gloves	Onion skins
Paper towels	Brown paper bags	Tobacco wastes	Bagasse (sugar cane residue)
Brewery wastes	Soggy Cheerios	Bird guano	Watermelon rinds
Grass clippings	Theater tickets	Hog manure	Date pits
Hoof and horn meal	Lees from making wine	Dried jellyfish	Goat manure
Malasses residue	Burned toast	Wheat bran	Olive pits
Potato peelings	Feathers	Guinea pig cage cleanings	Burned oatmeal (sorry, Mom)
Unpaid bills	Animal fur	Nut shells	Lint from clothes dryer
Gin trash	Horse manure	Cattail seeds	Bread crusts
Weeds	Vacuum cleaner bag contents	Clover	Cooked rice
Rabbit manure	Coconut hull fiber	Granite dust	River mud
Hair clippings from the barber	Old or outdated seeds	Peanut butter sandwiches	Tofu (it's only soybeans, man!)
Stale bread	Macaroni and cheese	Dirt from soles of shoes, boots	Wine gone bad (what a waste!)
Coffee grounds	Liquid from canned vegetables	Fish bones	Banana peels
Wood ashes	Liquid from canned fruit	Ivory soap scraps	Fingernail and toenail clippings
Sawdust	Old beer	Spoiled canned fruits and vegetables	Chocolate cookies
Tea bags and grounds	Wedding bouquets	Produce trimmings from grocery store	Wooden toothpicks
Shredded newspapers	Greeting card envelopes	Cardboard cereal boxes (shredded)	Moss from last year's hanging baskets
Egg shells	Snow	Grocery receipts	Stale breakfast cereal
Cow manure	Dead bees and flies	Urine (It's true!)	Pickles
Alfalfa	Horse hair		'Dust bunnies' from under the bed
Winter rye			

