

HOME HARVEST MAINTENANCE MANUAL





GROW REAL FOOD!

Home Harvest Maintenance Manual

First Edition

Table of contents

Introduction

Soil health

Soil testing

Soil texture/structure

pH

Plant nutrients

Compost

Carbon/nitrogen ratio

Cover crops

Watering

Soil toxins

Fertilizers

Sustainable soil
management

Plant health

Microclimate

Planning

Planting

Maintenance

Weeds

Disease

Insects

Other pests

Crop care

Tomatoes

Fruit trees

Strawberries

Raspberries

Blueberries

Grapes

The end of the growing
season

Season extension

Harvest, storing and
preserving

Recipes

Kids and agriculture

Patterns in nature

Ending thoughts

Introduction

Growing your own food is healthy and fun! The key to success lies in the health of the soil and care of your plants. This manual is structured to first teach you about the science of soil health, followed by garden maintenance information. Whether you're an avid or novice gardener, this text will give you an understanding of what it takes to keep your garden thriving and yielding abundantly.

"All the world's problems can be solved in a garden."

-Geoff Lawton, ecological designer

Growing your own food is empowering and positive, and you can look forward to harvesting quite a bit from your garden. Consider your garden to be like a classroom and every time you grow something, consider it to be a learning opportunity. In general, crop diversity equals garden resilience and the more bio-diverse your garden is, the more successful you will be. At HomeHarvest we take a sustainable, holistic and organic approach when managing our landscapes and we'll do our best to teach you how to care for your new garden.

Besides being attentive to your plant's needs in regards to watering, nutrients, pruning, weed control etc, we are generally at the mercy of the weather and now that you are a farmer, understanding this concept is key. When gardening, we are dealing with life, and life is fragile and sometimes hard to predict.

Sometimes we can do everything correctly and experience a crop failure due to extraneous events. Sometimes we can throw seeds over our shoulder, walk away for a couple months, and come back to an abundant harvest.

The term 'sustainability' is often misused to the point where it doesn't really carry any weight anymore. There is a real mentality behind the word, 'sustainability', however, one that resonates with HomeHarvest and informs the way we approach agriculture.

It's very easy to abuse soil and take it for granted. Human's mismanagement of soil causes erosion and degradation much faster than healthy soil naturally forms, and we rely on this fragile layer of topsoil for most of what we eat. Growing your own food and supporting local, sustainable-minded farmers is a giant leap in the right direction.

More than just a catchphrase, sustainability is a mindset and tending to a garden helps develop this way of thinking.

"The greatest threat to our planet is the belief that someone else will save it"

-Robert Swan

Sustainability is about planning ahead and providing future generations with healthy soil for growing food. Recycling, composting, reusing on-site materials, minimizing our carbon footprint; these are all aspects of sustainability. Mimicking nature's rhythms and efficiency provides valuable insight when designing our own food systems. This is especially true when our goals are to create long lasting, high yielding, and environmentally conscious farming systems.

When you have your own edible garden, everything you harvest replaces energy spent in unsustainable ways, and this is absolutely something to be proud of.

“The single greatest lesson the garden teaches is that our relationship to the planet need not be zero-sum, and that as long as the sun still shines and people still can plan and plant, think and do, we can, if we bother to try, find ways to provide for ourselves without diminishing the world.”

-Michael Pollen

In many ways, organic farms are more sustainable and better for our planet, however just because something is labeled ‘organic’, does not mean it is perfect. Organic farms can harm ecosystems just as much as conventional farms. **The ethics of the farmer and management systems in place dictate true sustainability.**

The most sustainable and healthy solution of all is to grow your own food.

At HomeHarvest, we like the term ‘real food’ because other adjectives just don’t cover the whole story. We know organic food can be grown in monoculture systems and shipped from halfway across the world, resulting in degraded soil, air and water quality. Local food can be heavily sprayed or grown unsustainably. We chose to define our own kind of food production.

Real food is grown in local soil rich in nutrients, organic matter and beneficial microbes. Real food is grown naturally, without any chemicals. Real food is harvested and eaten within a short time frame and the nutritional quality is

exceptional. Real food is alive, vibrant and nutrient-dense. We want you to GROW REAL FOOD!

Soil Health

To grow healthy, nutrient-dense food, healthy soil is essential.

The abridged basics:

- Test soil and check for pH, lead, and nutrients
- Water to achieve constantly moist but not saturated soil
- Maintain high levels of organic matter
- Mulch any areas that aren't already planted densely
- Keep the pH of the vegetable garden between 6-7
- Lime the soil every 3 or 4 years, based upon soil test results
- Fertilize based upon soil test results. Our compost accounts for all the needed plant nutrients however supplying a small amount of additional nitrogen can increase crop yield and quality.

Soil Testing

Soil testing is an easy and inexpensive way to address key issues regarding soil health and efficient nutrient management. The first step for any grower should be to test their soil and there are a few things to consider. Firstly, think about how the land has been managed for the last 100 years. How was the soil used and what's the management history?

If the soil you're curious about testing has been managed differently in different areas, take separate tests to represent each area. For example, HomeHarvest treats the area around houses as its own 'contamination-zone' because we know that lead accumulates around old houses due to paint cracking.

Identify the area and soil you want to test and take 12 similarly sized subsamples, each from eight inches deep. The location of these sub samples should be evenly spaced throughout the testing area (of similar past management). Then the subsamples can be mixed in a bucket and allowed to dry. Take one handful of soil and send it to a local lab. We recommend testing through UMASS Amherst because the lab calibrates soil improvement suggestions based upon regional research. When you fill out your test form, indicate which crops you are growing using the lab's list of crop codes. For \$10 per test, the lab will analyze your soil and provide crop-specific information detailing exactly what to add to your soil to maximize yields. We recommend testing your soil through a local lab every 3-4 years. The entire process takes about 25 minutes or less per test.

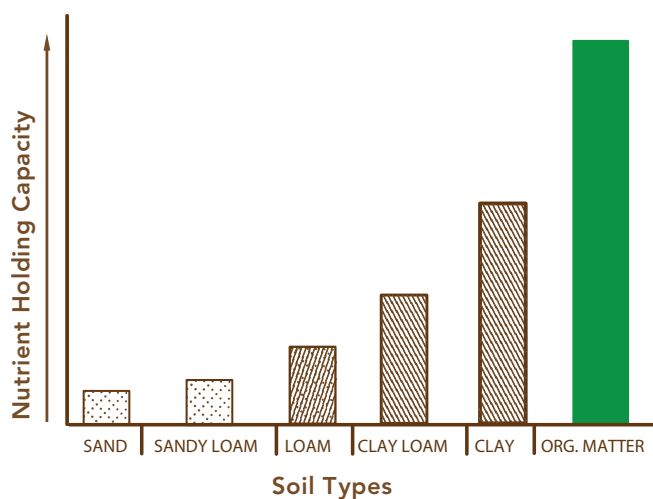
Soil Texture/Structure

Soil texture refers to the proportion of minerals in the soil, specifically sand, silt, and clay. Sandy soil is very different from clay soil. Different parts of the world have specific and varying soil textures, and texture is not something that is generally altered. We are forced to work with whatever texture we have.

Think of soil texture as the negative space in the soil. Sand particles are large and have large pore spaces whereas clay particles are like microscopic sheets and have small, but numerous pore spaces. Sandy soil has excellent drainage and doesn't compact easily, however it does not hold water or nutrients very well. Clay soil easily compacts, however holds onto water and nutrients like a sponge. Silt is somewhere in the middle. Loam in most cases is an ideal proportion of sand, silt, and clay, that benefits plant growth the most.

Clay and humus (the end product of organic matter) have a negative charge in soil. This leads to an attraction between positively charged nutrients and negatively charged soil particles. Because sandy soils have a low negative charge, many positively charged nutrients leach away. Adding clay to sandy soil is not practical, so instead, increasing the organic matter content in turn increases the soil's nutrient-holding capacity.

Whereas texture refers to the sand, silt, and clay in soils, soil structure refers to the arrangement of soil particles. Texture is something that growers do not change, however structure can either be improved or destroyed, depending on management practices. Large pore spaces allow for air and water movement, however smaller pore spaces allow for water storage.



Healthy soil has a diversity of pore spaces and adding organic matter is a great way to achieve this goal.

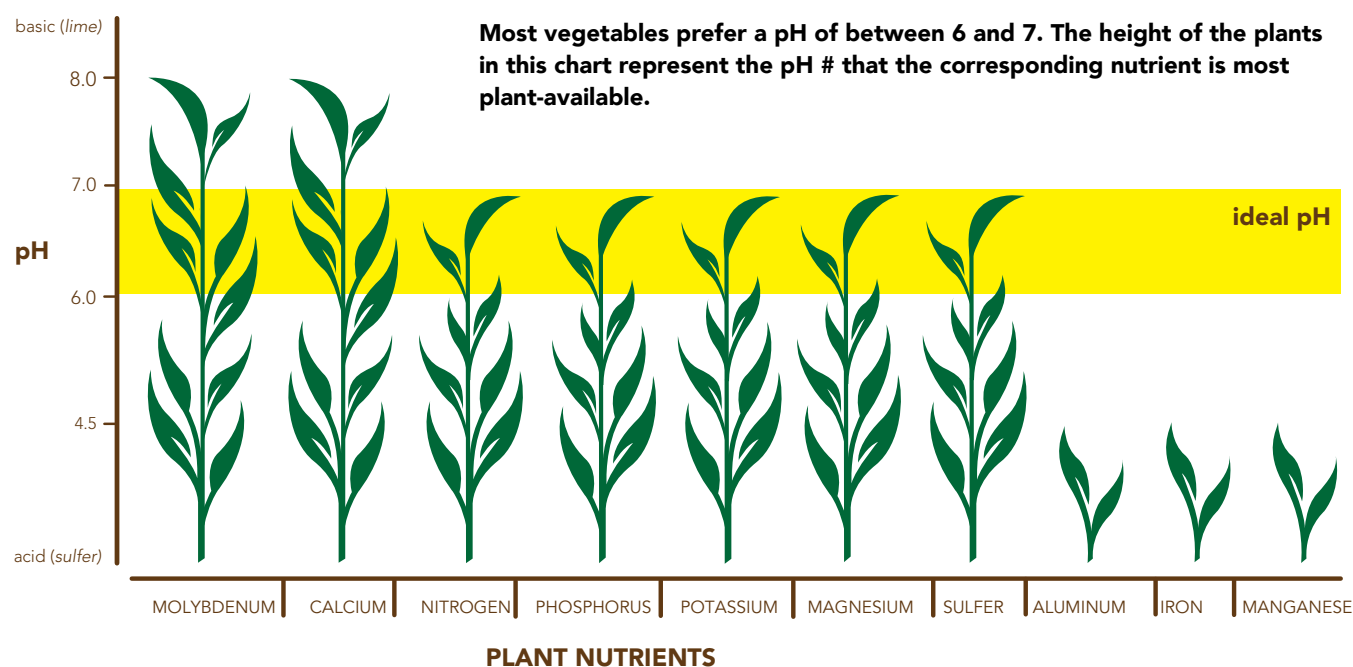
Constantly driving heavy equipment over soil, or constantly turning soil can lead to compaction and negatively affect soil structure. Growing a cover crop or adding organic matter such as mulch, manure or compost will improve structure, increase the diversity of the soil's pore spaces and also increase the soil's nutrient and water holding capacity.

pH

Varying levels of pH affect which nutrients are available to plants. For most vegetable crops, a pH of 6-7 is ideal. Maintaining the correct pH for your plants will result in higher yields. Due to precipitation, New England soils are often acidic. The compost HomeHarvest uses for installations is around 7, and each year the soil gets acidified by around $\frac{1}{2}$ pH. Lime and wood ash raises pH, however adding too much can lead to plant toxicity issues. To raise pH, lime can be mixed into soil anytime, however liming in autumn is considered ideal. Depending on the grade, lime takes many months to react

in the soil, so soil testing and liming in the fall is the best way to prepare for spring planting. Quick lime is very fine and changes pH faster than regular lime. Liming is important because it maximizes the availability of nutrients to plants, as well as prevents aluminum toxicity, a problem associated with acidic soils.

Some plants such as blueberries, mountain laurels, rhododendrons and azaleas prefer



acidic soil. Aluminum sulfate or elemental sulfur can be mixed into the soil to acidify in preparation of planting. Do not add lime near plants that prefer acidic soils, nor should you add acidifying agents near plants that prefer neutral soils. 'Acid-loving' plants such as blueberries actually do not love the acid in the soil, but rather require the nutrients that are more available in acidic soil, such as iron and manganese. Follow your soil test

instructions to determine how much sulfur or aluminum sulfate to add and be careful not to over-apply, which will lead to plant toxicity issues.

The pH scale is logarithmic; 4pH is 10 times more acidic than 5pH, 100 times more acidic than 6pH and 1,000 times more acidic than 7pH. Make sure your pH is in proper alignment and the difference of one pH in the wrong direction can have significant repercussions.



Although there is plenty of iron in the soil, because the pH is too high, the blueberry plant in this photo is displaying iron deficiency. Neglecting to alter the pH for your crops will result in lower yields, wasted fertilizer, greater susceptibility to disease and insects, and stunted growth or death.

Plant nutrients

The compost HomeHarvest uses is very fertile and accounts for all the essential plant nutrients, with the exception of enough nitrogen. We often use certified organic feather meal to supply nitrogen (N) to plants.

Timing and quantity of fertilizing is important to achieve success. Too much N-fertilizer results in greater disease and insect susceptibility, plant and human toxicity, and

lodging (falling over), as well as wasted resources and environmental pollution. The 4 R's of nutrient management need to be taken into consideration; the right time, right place, right source and right rate.

The correct amount of nitrogen results in healthy vegetative growth, sweeter and more succulent-tasting produce, and higher protein content. Roughly 4-8 pounds of feather meal per 100 square feet is sufficient. Mix some feather meal into the top four inches before planting and your plants will thrive. To avoid winter injury, only fertilize perennials in the spring. Annuals can be fertilized throughout the season, however remember that over-fertilizing is more problematic than under-fertilizing.

In general, just because nutrients are present in the soil does not mean that they are available to your plants. Temperature (ideal=about 50-90 degrees F), adequate moisture, the correct pH, and the right balance of nutrients influence how effectively your plants absorb nutrients.

About three years after a HomeHarvest garden installation, we advise switching from just using blood or feather meal, to regularly applying a balanced fertilizer, containing nitrogen, phosphorus, and potassium. You can also reapply compost that you make each year.

By the time a nutrient deficiency is noticed, irreparable damage has been done and even if the correct nutrient is added, the yield will never be the same. Because of this, make sure the needed nutrients are in the soil at the time of planting.

Compost

Compost is an invaluable soil amendment, which provides plant nutrients and increases the soil's stability and water/nutrient-holding capacity. Compost can be thought of as a long-term fertilizer. As compost continues to decompose in the soil, microbes release plant available nutrients. Just using compost alone may not provide all the necessary nutrients for some vegetables. Mulch, among many other benefits, will also slowly decompose and add some nutrients over time.

The art of making quality compost has a lot to do with the carbon to nitrogen ratio of the inputs you decide to add.

Layer the nitrogen-rich materials with carbonaceous materials such as hay, straw or dried leaves. If the pile has too many nitrogen inputs, it will begin to smell; carbonaceous materials should be incorporated. If the pile has too much carbon, decomposition will occur too slowly or not at all. Striking the proper balance is crucial and will take some time and experience to master! When managed correctly and with enough inputs, the pile will heat up and kill off most weed seeds and potential pathogens.

The balance of carbon to nitrogen is important in the composting process as well as in the soil itself. **There is a special relationship regarding how carbon and nitrogen interact with soil microorganisms.** If out of balance, your plants can suffer.

Let's say we have lots of sawdust (or anything high in carbon) and we mix it into soil. Microorganisms in soil require nitrogen to break down the carbon. The microbes in the soil will use up all the nitrogen to decompose the sawdust, and through a microbial

process called immobilization, no nitrogen will be left for your plants. Nitrogen deficiency will result and the plants will die.

From the opposite side of the spectrum, let's say we have composted chicken manure or compost, which is higher in nitrogen, and mix that into the soil. The microbes will decompose the manure and because there is so much nitrogen present, the microbes will release this nitrogen into the soil. If there are plants present, they will benefit from this mineralization or release of nitrogen.

When composting, the more material added at once, the faster and hotter the decomposition. The material added which is smaller and ground up (such as grass clippings) will decompose faster. Ideally, the pile should be slightly moist throughout the whole process. Although not always necessary, the pile should be manually aerated about once a month to encourage airflow. When the compost has completely cooled down and the inputs are no longer recognizable, the compost is ready to be applied to your garden. It should look like dark, healthy soil and smell pleasant and earthy. Ideally, the compost is applied to the garden about two weeks before planting. The entire process can take as little as one month, however it usually takes 3-6 months depending on skill and the amount of material added at once. If you're adding only a few inputs periodically, the process will take longer.

A few tips to composting:

- Locate your bin closed to the garden to facilitate applications.
- If there are nearby trees, avoid letting the bin come in contact with the ground; roots from trees can suck all the life out of your compost. A platform may be necessary to avoid tree root contamination.
- During the layering of carbon and nitrogen materials, add some finished compost or topsoil to encourage faster decomposition.

-Microorganisms are responsible for the composting process. Composting over winter takes significantly longer as microorganisms are dormant and do not actively decompose under 40 degrees F.

-Composting is an aerobic process; keep a garden fork nearby to manually aerate the pile every so often when you add new material. If the material is too dense or wet, a lack of airflow will result in unattractive smells. Maintain airflow and a proper carbon/nitrogen ratio in your compost pile.

Cover Crops

Many farmers and gardeners incorporate cover crops, or green manures, into their agricultural operation. We recommend this practice, especially for those with large gardens. The idea behind a cover crop is simple; grow a crop with the intention of killing it and turning it into the soil. The result of this practice is intended to increase decomposing organic matter, which in turn provides nutrients to the crops planted into that soil.

An example of this practice is sowing annual ryegrass at the end of the season in the fall. Many of the nutrients applied this season will be lost over the winter, primarily nitrates due to leaching loss. The rye grass will absorb these nutrients and hold them in their biomass. Come spring, when the rye is tilled into the soil, the microbes decompose the organic matter from the cover crop and after a few weeks, nutrients are released. By competing with the weeds, this practice helps to reduce weed competition over time. Cover crops also prevent wind and water erosion while improving soil structure, porosity, and water/nutrient holding capacity.



Tillage radish is another kind of cover crop. Growing quickly, the radish smothers competition and helps to control weeds in future years. The taproot from the radish penetrates deep into the soil and reverses compaction through allowing air and water movement in the soil. Because tillage radish is frost-sensitive, it gets killed in the late fall and the fields are ready for planting in the spring.

Some plants, such as vetch, field pea, and clover, 'fix nitrogen' from the air. This means that the plants have the ability to absorb nitrogen from the air and hold that nitrogen in their roots. When tilled and incorporated into the soil, the nutrients are released and aid the growth of the next crop.

Growing a cover crop is a sustainable practice and makes sense on a larger scale, especially where leaching losses or erosion is significant.

Watering

Nutrients are only available to plants when the soil is at field capacity (saturated).

Constant moisture in the soil results in healthier plants and larger yields. Water the garden thoroughly and deeply, especially when the soil is dry; make sure the water percolates deep into the soil. Watering just the surface, without allowing deep infiltration, will cause plant stress and may lead to other problems. Sometimes the top inch can appear wet however the soil is dry down deeper and poking in with your finger can be an effective moisture gauge. Pay special attention to sufficiently water recently planted seedlings/plants and newly sown seeds. Many seeds need consistent moisture to germinate, however too much water can lead to root rot and a lack of germination.

Using mulch such as salt marsh hay will help retain moisture, as well as suppress weeds and maintain uniform soil temperatures, which helps to avoid winter injury. Be careful not to over-water, which will lead to disease and cause the plants to wilt (easily mistaken under-watering). Over-watering results in a lack of airflow in the soil; plants also need access to oxygen in order to thrive. We should strive to achieve balance between enough water and air in the soil. With regards to perennials, such as trees and shrubs, deep and thorough yet less frequent watering (1-2x/week) will be ideal for newly planted perennials. Most perennials do not require watering once established unless the weather is very hot and dry.

Wetting the leaves of plants can lead to disease and fungal issues; effort should be made to only water the root zone. Tomatoes, squash and fruit trees are especially susceptible to leaf diseases associated with lingering moisture. We think drip lines are

the most efficient form of irrigation. Through using drip lines, water is delivered directly to the roots and very little is evaporated and the leaves are left dry.

Prolonged dry soil will result in deficiencies even if the nutrients are present. Calcium, for example, requires sufficient water to be available to plants. Without water, the calcium is unable to travel to the end of tomatoes, causing a disease called blossom end rot.



This tomato is displaying calcium deficiency, or blossom end rot, likely brought about by drought. There is plenty of calcium in the soil however. Sufficient watering would have likely prevented this disease. If too much water was provided, however, calcium deficiency can also occur. Plants need at least one inch of water per week in the form of rain or supplemental irrigation. Mulching really helps to maintain moisture consistency.

Soil Toxins

Any element on the periodic table can pose toxicity issues with plants and achieving the right balance in soil is essential. Especially in cities, lead is the most problematic toxin. Lead used to be used in paint and as a fungicide in orchards. Because lead is a metal, it is still prevalent in soils today and poses significant risks to those who come in contact with it.

Careful soil testing and understanding where soil on a given property is contaminated is the first step. Breathing in lead dust is the main source of human contamination and can be easily avoided through covering the soil with a thick layer of loam, mulch and/or a dense ground cover. When lead concentrations are understood, minimizing plant-bioavailability of lead is crucial. Just because lead is in the soil does not mean that plants are able to absorb it into their tissues. Often, bringing in new, clean soil is the safest way to grow near contaminated soil. A heavy-duty landscape fabric may be needed in extreme cases to act as a physical barrier. Maintaining a neutral soil pH, adequate phosphorus and organic matter are ways to reduce the bioavailability of lead. Often simply adding compost can make the lead less available to plants. Lead does not generally accumulate in fruit where as leafy greens, root crops, and mushrooms are susceptible to absorbing lead in their tissues. Washing your produce before eating is always a good idea.

Over-fertilizing, especially with synthetic fertilizers, can lead to toxicity problems and efforts should be made to carefully follow application instructions. When dealing with fertilizer, more is not better; in fact it's just the opposite. If you apply too much

nitrogen, for example, the nitrate can convert to nitrite, which is toxic to humans. Salts, such as road salt, behave in soil similarly to synthetic fertilizer. Salts and fertilizer have the ability to 'pull' water out of roots, even if plenty of water is present in the soil. For many other reasons as well, we recommend sticking to organic fertilizer, which is safer, healthier, and has less risk attached.



Fertilizer

Organic fertilizer such as manure, compost, bone meal and feather meal is derived directly from plant and animal sources whereas conventional fertilizers are synthetically made. Most conventional fertilizers are derived from naturally occurring mineral deposits and are synthetically altered to increase their bioavailability.

Although HomeHarvest only use organic fertilizer on our edible gardens,

we recognize that there are pros and cons to each and neither type is better in every situation. Plants do not recognize the difference between organic or conventional fertilizers. Once the fertilizer is in the soil, plants take up the exact same nutrients regardless of whether the fertilizer is organic or not. Organic fertilizers, although they are more expensive and lower in potency, offer other benefits besides supplying nutrients.

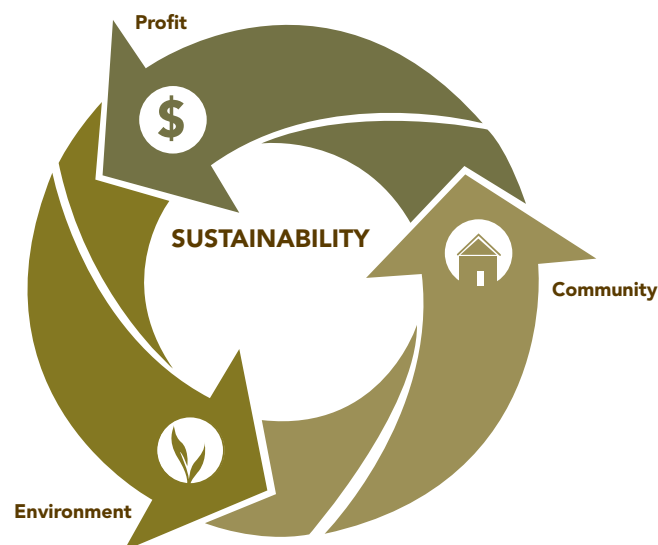
The compost we use supplies most the nutrients needed and because our fertilizer and compost are derived from organic materials, microorganisms are needed to make the

nutrients available to plants. The mineralization of nutrients from organic sources occurs slowly throughout the season. Synthetic fertilizer on the other hand is immediately water-soluble and the plants have instant access to the nutrients. Water-soluble, non-organic fertilizers generally have higher quantities of nutrients and these types of fertilizer are easy to over apply.

The nutrients that are most often deficient are also needed in the largest quantities. These are called macronutrients and consist of Nitrogen, Phosphorus, Potassium, Calcium, Magnesium and Sulfur. Nitrogen, Phosphorus and Potassium are the three major plant nutrients that are most often deficient and many fertilizers contain a balance of these three (called NPK).

Many people think that organic fertilizers are better for the environment, however **the grower's management strategies are what ultimately determine the effect on our environment.**

Sustainable Soil Management



The way we manage soil can either improve or destroy soil structure and fertility. Human foot traffic or machinery leads to compaction, which hinders air and water movement. Monoculture-style farming systems result in a dependence on pesticides, herbicides and fungicides due to a

lack of natural balance. Anytime humans intervene with nature's rhythms, we are fighting an uphill battle. Sustainability is about thinking long term and we have the ability to meet today's needs while enhancing tomorrow's potential.

If fertilizer is over-applied, nutrients can leach and cause environmental pollution. Nitrate, a form of nitrogen, is prone to leaching with rainfall or irrigation. This leaching leads to eutrophication of waterways, also known as algae blooms. The result is an oxygen-starved body of water where little marine life can live and the effects are disastrous. Both organic and synthetic fertilizer can cause this problem and the management technique of the farmer is what causes or prevents this problem from occurring.

If nitrogen were applied in small, but steady increments, the plants would have more efficiently absorbed the fertilizer. If the farmer grew a cover crop after or during the season, any excess nutrients would have been absorbed in the cover crop, limiting leaching and storing the nutrients for the following crop. If organic matter levels in the soil were already high before planting, less fertilizer would have been needed in the first place.

Do you have a large lawn on your property? You manage a monoculture system without even realizing it. Do you fertilize your lawn? Perhaps nutrients are leaching and you're contributing to water pollution. Avoid monocultures, grow many different kinds of plants, and practice crop rotation. Lawns can certainly have their place in the landscape; we think it's important to be aware of how our properties affect the surrounding environment.

Because nature favors biodiversity, diverse ecosystems are more resilient!

The most sustainable and resilient farming systems are localized, have a high level of plant diversity, incorporate both annuals and perennials, and recycle all onsite materials whenever possible.

Making your own compost and recycling onsite materials is easy and we can all do it. Eliminating biodegradable material from the waste stream is important and 1/3 of all landfill inputs could have been composted. Rather than throw away food scraps, napkins and leaves, compost them. Rather than throw away newspaper, spread it under mulch and prevent weeds from competing with your crops. In the fall, there is an abundance of leaves. Rather than bag them up for town collection, recycle them where they naturally fall. You can mow over them with a lawnmower and allow them to decompose in your garden beds, contributing to healthy soil. The decomposition of leaves and other forms of organic matter releases nutrients for your plants the following season.

In conclusion, healthy soil has an abundance of organic matter, air movement, moisture, nutrients in the correct balance, the right pH for each plant, and a carbon to nitrogen ratio favoring the mineralization of nutrients.

Healthy soil is alive. Healthy soil is free from toxins. Constantly feed your soil (in the form of compost, mulch or plant diversity) and keep your soil healthy! Healthy soil grows healthy soil, which makes us healthy!

Now let's move on from soil health to garden tasks and design-related concepts.



Microclimate And Site Selection

Climates greatly fluctuate, even in a small area. In one small back yard, there likely several kinds of microclimates and understanding the limitations or potential of each microclimate is fundamental towards being a successful grower. Sometimes the difference of a couple feet can dictate which plants thrive or not.

Sunlight is one of the main factors when addressing your microclimate. Trees, structures, hillsides and other sun obstructions should be observed from the perspective of a plant. Using a compass, imagine the arch of the sun from east to west, understanding that the sun's arch is higher and wider in the summer and lower and narrower in the winter. Observe the sunlight patterns of your property and analyze how much light various sites receive during different times of the year. Maybe the area that gets full sun in June and July gets no sun in the spring and fall. Maybe the area that looks like it gets full sun in winter is actually shaded in the growing season because of the deciduous tree you forgot about.

The slope of your site affects the sunlight intensity. South facing slopes are generally hotter and crops such as grapes will benefit from the heat and sun exposure. South facing slopes also warm up much faster in the early spring, and resulting temperature fluctuations can damage susceptible plants. When low nighttime temperatures follow hot daytime temperatures, flowers are prone to frost damage (Damaged flowers=no fruit). The constant warming and cooling can actually push some plants out of the ground through a process called 'frost heaving'. Mulch helps to prevent this from happening.

North-facing slopes, however, take longer to warm up in the spring, resulting in less temperature fluctuation and less risk of frost damage. East facing slopes are cooler where as west facing slopes capture the hot, afternoon sun. Certain crops prefer certain microclimates and the ideal placement of crops leads to higher productivity and healthier plants.

Objects with a dense mass can be referred to as thermal mass. As the sun heats objects such as stonewalls, patios, brick walls etc, the heat is slowly released at night. This causes unique microclimates, which are slightly warmer on cool nights. For example, locating your rosemary or tomatoes next to a south facing stonewall may result in higher yields and a longer growing season. We've experienced rosemary overwintering next to stonewalls where as just a couple feet over, the rosemary died from cold exposure. It's fascinating how a slight difference in temperature can be the difference between life and death.

Too much water on a site can have disastrous effects. Plants need oxygen in their root zone to support respiration and waterlogged soil leads to increased disease and pest pressure. Pay attention to how water moves through your property. Allowing water to soak in without becoming water logged is ideal. Water moves downward and frost behaves in the same way. Imagine frost moving just as water does and you'll be able to predict which areas of your property are most prone to frost-damage. At the bottom of

a slope, if the cold air has nowhere to go it will settle, causing what's called a 'frost pocket'. Fruit trees and certain plants are prone to frost damage, especially if they break from dormancy too early.

If your site is too exposed, wind can be problematic. Trees, fences, buildings or other structures may block light, however they can also act as a windbreak.

Locating your garden too close to trees can result in problems, and it's important to understand how quickly trees grow and spread. Trees have the potential to shade gardens, or suck nutrients and water from the garden and compete with crops. Norway Maples are especially troublesome and cast dense shade, have shallow surface roots, and steal water and nutrients from the garden. The best approach unfortunately is to cut down the tree, or else you'll be battling nature and these trees are relentless.

Taking the initial extra time to analyze your microclimate and plan accordingly is really important for successful gardening.



The Timing of Gardening

Because we are trying to maximize the sun's light during the growing season, planting dates ideally occur at specific times.

Regular activities throughout the growing season include watering, harvesting, replanting, thinning, weeding, and pruning. **Try to get in the habit of sowing seeds or planting something every couple of weeks. This easy and quick activity ensures a steady harvest throughout the season.**

It's important to constantly monitor your soil moisture levels. Directly after sowing seeds or planting, for adequate seed germination it's necessary to water more frequently. Also when it's hot and dry, water deeply and more often. Once the plants are well rooted and established, watering every few days is OK. The soil should be constantly moist but not soaked. Airflow at all times in the soil is very important. Rather than having an irrigation schedule, instead irrigate according to the weather.

Cold hardy seeds such as peas, carrots, beets, onions, lettuce and micro greens can be sown as early as march 20th, however if the ground is still frozen or covered with snow at this time, you can wait until early April.

Bare-rooted perennial crops (strawberries, raspberries, currants, gooseberries, fruit trees etc) should only be planted in the early spring around April or early May.

The last frost of spring in the Boston area is usually in the end of May. At this time, all warm weather crops should be planted, including tomatoes, basil, beans, peppers, eggplant, squash, corn etc. Planting warm weather crops before the end of May is risky

and not recommended; if there is a frost, the risk of stunting or death is high and you'll have to replant.

Winter is a time of reflection, learning new techniques, and planning for spring. Now's the time to look through seed catalogues and dream of all the cool things you're going to grow. We recommend Jonny's Seeds, Fedco, or High Mowing Seed Company. These companies are mainly organic, non-GMO, and have good customer service.

It is very important to order your bare-root perennials over the winter or in the early spring. We recommend buying berry plants through Nourse Farm in western Massachusetts. Planting fruit trees, blueberries, raspberries, strawberries, currants, gooseberries etc. as bare-rooted specimens must occur in a narrow window in April or early May. Selecting the right perennial for your specific location requires research and planning and we recommend you do this research work in winter.

We all know when spring rolls around we gardeners just want to get out in the garden and start digging and planting. Do your homework over winter so you can play in the spring!

Planning the garden layout

To decide where plants should be located, it's important to understand the sunlight patterns of the property. For fruit producing or root crops, full sun (8-12 hours) is ideal. Plants such as greens and many herbs however will thrive in 3-6 hours of light.



Generally, locating the tallest plants to the north will help prevent shading of other crops. Greens, however, thrive in some shade and HomeHarvest is famous for planting micro greens under kale, broccoli, cauliflower, chard or herbs.

Allowing airflow and sunlight penetration is the best defense against disease for fruit producing plants such as apples, peaches, cucumbers, and tomatoes. Be sure to set aside adequate space for crops that produce fruit, as overcrowding usually leads to disease, especially in wet weather.

Growing plants vertically is a great way to maximize the growing space and create an 'outdoor living room' feel to the garden area. Tomatoes, pole beans, cucumbers, and some types of squash will climb up a fence or trellis, increasing the plant's sun exposure and in turn, overall yields.

If growing in a heavily trafficked area, such as a front yard, consider which plants look the nicest and locate them closer to the main access paths. Tomatoes, for example, inevitably tend to look messy toward the end of the season, and disease is common in this part of the country. The disease, however, is usually located on the bottom half of the plants. You can plant other plants in front of the tomatoes to hide the disease.

Aesthetics matter and a space that is well designed and attractive is more likely to be used and appreciated. Incorporating custom stone work and ornamental flowers into the plan are great ways to harmonize the garden with the surrounding landscape. Flowers also attract beneficial insects and aid with crop pollination.



As annual vegetable crops age, at some point the production will slow down. At this time, uprooting the plants, composting the remains, and replanting is a good idea. Employ crop rotation whenever possible and pay attention to the nutrients in the soil; as plants take up nutrients, sometimes the nutrients need to be replaced, especially nitrogen.

Companion planting, or planting certain crops together is worth looking into. *Carrots Love Tomatoes*, by Louise Riotte, is a great book about companion planting. For example, tomatoes seem to enjoy the company of basil, asparagus and members of the allium family (onions, leeks, chives, garlic etc). Brassica family crops (cabbage, broccoli, cauliflower etc) grow well with an under story of micro greens (arugula, tatsoi, boc choy, lettuce etc), and supposedly shouldn't be located near vegetables from other families.

With annual vegetables, having perfectly straight rows and carefully counted plants is more of an aesthetic consideration and doesn't really affect yield. The important thing is to allow proper spacing for each plant, which can be determined by reading the spacing requirements on the back of the seed packet. Perennial planting and spacing, however, should be well thought out and spaced perfectly according to growth habit and maturity size.

Different varieties of various vegetables influence spacing requirements, however the following is a general list of different spacing needs for common vegetables. Because the spacing of perennials is so variety-specific, to find this out we recommend consulting with the supplier.

Upon sowing the seeds, many vegetables will likely be too dense. Proper spacing is often achieved through thinning to the desired width once the seeds have sprouted. P=spacing between plants in the row. R=row spacing to allow for access or growth.

Asparagus; p=12-15" r=5'

Bush beans; p=3-4" r=12-24"

Beets; p=2-4" r=12-24"

Broccoli; p=24" r=24-36"

Cabbage; p=24" r=24-36"

Carrots; p=1-2" r=12-18"

Corn; p=3" r=24"

Cucumbers; p=12-48" r=12-48"

Eggplants; p=24" r=36"

Horseradish; p=4'

Lettuce/greens; broadcast sow (scatter in blocks) or in narrow rows 8-12" apart

Onions; p=2-3" r=12-18"

Peas; p=2-6" r=36"

Peppers; p=12-24" r=24"

Potatoes; p=8" r=36"

Pumpkins; p=6-8" r=36"

Radishes; p=1-2" r=6-12"

Rhubarb; p=24" r=24-36"

Tomatoes; p=16-36" r=30-36"

Turnips; p=3-5" r=15-18"

Watermelons; p=72" r=72"

When it comes to overall site design, there are so many things to consider; microclimate analysis, soil health, plant selection etc. Try to think of all these things as being connected. A well-designed garden looks is inviting, beautiful and yields abundantly.

Every element of the design will be more effective if it serves multiple functions. For example, just one tree can be used to create shade, prevent erosion, act as a privacy screen, attract pollinators to the garden, yield edible fruit, add pleasant aromas, and also look attractive. A patio can be used to create a social space, but it can also be used to direct water to an area of the garden, collect heat and favor certain plants' growth, prevent fast-growing plants from spreading etc. A fence can be used to delineate spaces, but it can also be used to create shade, act as a trellis for plants, sound barrier, privacy screen etc.

Try to get in the habit of imagining the potential of each design element; be creative. If you spend the time, every object can serve multiple functions and the result is an efficient and clever design.

Planting And Sowing Seeds

Oftentimes, a combination of sowing seeds directly into the soil and planting established seedlings makes the most sense.

Plants we recommend sowing from seed includes salad greens, beans, carrots, beets, radish, turnip, some herbs, and potatoes (grown from tubers). In general, if you love a crop from this list, the best approach is to plan for a succession. This entails constantly sowing seeds, which leads to staggered harvests. For example, sowing a handful of beans every couple weeks will result in beans ready for harvest throughout the whole season. When sowing seeds, try to avoid sowing too many at one time.

When sowing seeds, the type of plant and variety will dictate the spacing of the seeds and row width. Lettuces and micro greens can be planted densely in blocks instead of in rows, where as beans, carrots, potatoes etc. should be sown in rows. In general, if the seed is very small, only cover it with a small amount of soil or compost. If the seed is larger, like peas or beans, the seed should be sown deeper in the soil. Each seed packet will have specific instructions regarding spacing, ideal germination temperature, and sowing depth. It's important to keep the soil consistently moist, but not soaked, for at least two weeks following the sowing of seeds.

Annual plants (surviving only one season), which are better to plant as seedlings, include tomatoes, peppers, eggplant, herbs, kale, chard etc. Squash, cucumbers and pumpkins can be sown from seed or planted as seedlings. Squash and cucumbers are also best planted in succession to allow consistent harvests. When planting seedlings, dig a small hole and plant the seedling such that the height of the soil remains consistent with the potting mix. Only tomatoes can be planted deeper into a hole. This

is due to the fact that tomatoes will re-root at any point on the stem. Planting any other plant too deep may result in stem rot and disease.

Perennial crops can be planted as seeds, bare-root seedlings or root cuttings, or established potted plants. Established potted plants usually come into production sooner however seeds or bare-rooted seedlings are often healthier once established.

The golden rule of farming or gardening is to KEEP ON PLANTING! The more often you plant more of something, the longer you'll be able to harvest. Just keep planting seedlings, sowing seeds, and planting some more!

Thinning

Root crops such as carrots, beets, radish and turnips need to be thinned in order to fully mature. When the plants are young (1-2" high), remove enough of the plants so there is only one small plant every two or so finger's width. This sometimes means uprooting over half your crop. Beet thinnings are especially tasty in salads or used as a garnish. Without thinning, the root crops will taste woody and not fully mature. You may feel like a jerk pulling out most of your crop but you'll be happy you did when you harvest.

The same idea with root crops is true for tree fruit. When apples, pears peaches etc. are thinned, the resulting fruit is larger, tastier and of a higher quality. When the apples are very small, remove 1/3-1/2 of the fruit to allow for adequate growth. If a fruit tree is not thinned properly, overbearing will cause limbs to break, the fruit will be too small, and the trees may not produce the following year.

Managing Weeds

A weed is defined as any plant in the wrong place. Weeds block sunlight and prevent and water from reaching our crops. There are many approaches to dealing with weeds. Manually stirring, or cultivating soil kills young weed seedlings, especially in sunny weather. Manually killing young weeds can take time and we recommend mulching or planting densely to prevent weeds from becoming an issue. Mulch is a great preventative technique, and helps to avoid weed seed germination, as well as retain soil moisture and moderate soil temperatures.

Organic mulches, such as shredded leaves or salt marsh hay, will provide nutrients through their decomposition, and promote soil-organism health. Be careful when buying mulch, as some hay/straw may contain noxious weed seeds. Spreading overlapping layers of newspaper or cardboard (without plastic or glossy material) under the mulch will provide another line of defense against weeds and will help retain more moisture.

Perennials such as blueberries and fruit trees benefit from a healthy 2-4 inch layer of mulch. Fluctuating temperatures in the early spring and fall can cause winter injury and frost heaving. Frost heaving is caused from freezing and thawing, pushing plants out of the ground and exposing roots. Mulching soil moderates soil temperatures and prevents plants from getting stressed. South facing slopes, which heat up faster in the spring, are especially susceptible to frost heaving. Be careful to prevent mulch from touching the trunk of trees or shrubs, as this can increase risk of trunk rot. At HomeHarvest, we like to work with locally sourced leaf mulch (for perennials and paths) and salt marsh hay (for vegetable gardens). Adding a thick layer of mulch each spring to your garden, over a layer of cardboard or newspaper can prevent hours of weeding

and is worth the effort. We recommend you save all your autumn leaves for composting or mulching.

If we aren't mulching areas of the garden then we like to plant or sow seeds densely. This technique of planting basil, greens, flowers or herbs close together helps to prevent weeds through competition. Many plants that produce fruit such as tomatoes and strawberries, however, require adequate space to perform optimally.

Harvesting

This process is usually pretty intuitive, however there are a few things to consider. In general, vegetables are more tender and succulent when harvested young. Harvest fruit with a knife or pruner to avoid tearing the stem.

Micro greens: After 3-5 weeks from sowing seeds, when the greens are about 4 inches high, you can begin harvesting with scissors. If you leave some foliage at the plant's base, one or two more harvests can be expected from the re-growth. In the heat, some of these greens will go to seed or 'bolt'. Some of the green's flowers are edible and you can keep hacking them back and the re-growth is edible. At some point, pull out all the greens that are past their prime and replant more greens or another crop. The greens are more tender during cooler weather and can get more bitter in the heat.

Herbs: Every herb is different, however once established, you can continue to harvest the tops and wait for re growth. Basil's flowers can be pinched to keep the energy focused on foliage instead of seeds. Paper bags work well for drying herbs and the best time for drying is in the late summer.

Kale, chard, and collards: Harvest the lowest, oldest leaves first, working from the bottom up. Start harvesting when the leaves are sizable.

Broccoli and cauliflower: Cut the head when it's sizable. Depending on the temperatures, smaller and tender side shoots may follow the main crop and can be harvested. If not harvested in time, the heads will form flowers.

Peppers and eggplant: Pick when large enough. The peppers don't have to change color to be considered ready.

Tomatoes: pick when ripe. Different varieties of tomatoes ripen in different colors such as yellow, orange, purple, and striped with green. If critters are eating some of your veggies, tomatoes can be harvested when just starting to ripen and allowed to finish ripening indoors. (Put the un-ripe tomatoes in a paper bag with a banana or other tomatoes to facilitate the ripening process.)

Root crops: Dig up potatoes as the above ground growth starts to die back (after flowering). Beets, radish, turnips and carrots can be harvested at any size. The smaller the vegetable is, the more sweet and succulent it will be. If left in the ground too long, the flavor may suffer and the texture can become woody.

Summer squash: Harvest the squash when young and tender. Make sure to constantly check under the large squash leaves to avoid letting any one squash get too big. Especially when warm and moist, squash can grow and mature quickly; try to stay on top of the harvesting. Large squash can lose some flavor and will have more seeds, however when baking zucchini bread for example, large squash can be OK.

Winter squash: Harvest when sizable and before a major frost.

Beans and peas: Harvest at any stage and continue to harvest once the plants start to produce. Really large beans and peas are still edible but tend to be less tender.

Berries: Wait until fully ripe. The sweetness and excellent flavor of berries, especially blueberries, comes with a bit of patience. Berries will not ripen if harvested too early. Raspberries should easily pull off the end of the stem. Do not let the berries over ripen, however, which may lead to rot and insect damage. For best results, harvest frequently.

Tree fruits: wait until fully ripe. Different varieties ripen at different times. When sizable, harvest one to test sweetness levels. When growing apples, starch tests are effective at gauging ripeness.

Tomatoes

There's nothing quite like a fresh, vine ripened homegrown tomato. Tomatoes are also one of the more difficult vegetables to grow and there are a few things to consider. The growth habit of tomatoes is pretty hectic; left to their own devices, tomatoes will sprawl out and take over the whole garden. If any part of a tomato plant touches the ground, it will re-root and lead to a messy garden that is hard to access. Staking up the plants and keeping the fruit off the ground will help to facilitate access, prevent ground rot, and limit critter damage.

There are many approaches to staking tomatoes. Individual stakes or cages can be used for each tomato plant. In this instance, the tomatoes need to be tied to the individual stakes periodically. Taller, 8 foot and thick poles (2"/3" thick) can be erected (dug into the ground 2 feet) with wire atop, and the tomatoes can be strung up to the wire and spiraled around the string. Another way involves 5 foot stakes hammered into



the ground, with plants in between the stakes and sandwiched between layers of string (wrapped around the stakes).

Tomatoes require special pruning to achieve optimal yields. 'Suckers' are particular tomato branches that suck energy from the plant. When pruned consistently, they are easy to manage. Suckers restrict sunlight penetration and prevent drying, leading to an increase in foliar diseases such as Blight.

Suckers originate from the base of the plant, as well as from the angles between the main stem and the side stems. Different varieties of tomatoes need to be pruned accordingly and the vine type is usually apparent on the plant's tag from the nursery. Indeterminate varieties of tomatoes (most cherry and heirloom varieties) should have only one main stem; so all suckers must be removed. Determinate varieties don't need to be suckered.

Once you get in the habit of suckering and training your tomatoes to grow in an organized way, you'll really enjoy the superior flavor of your own tomatoes.

"It's difficult to think anything but pleasant thoughts while eating a homegrown tomato." ~Lewis Grizzard

Raspberries



Raspberries prefer a soil pH of between 6-7 and fertile, well-drained soil. There are two types of raspberries, summer-bearing and fall-bearing. Fall-bearing raspberries produce berries on the tips of same season growth. Summer-bearing raspberries yield throughout the stem of second-season growth. To achieve a long harvest window, we recommend planting both varieties, however each kind of raspberry needs to be pruned and managed differently.

Fall-bearing raspberries are easiest to grow however they're susceptible to insect damage. In the late fall or early winter, they should be mowed or pruned all the way to the ground. The growth from the same season will yield berries around September.

Summer-bearing raspberries yield on second year growth and when pruning these types of raspberries, leave about two feet of wood on the ground and prune the rest. The new shoots from the ground that grow in the spring should be partially pruned/suppressed to allow airflow and sunlight penetration throughout the plant.

Both kinds of raspberries require some sort of trellising to perform at their best. We recommend using a T-Trellis, which helps to maximize sunlight penetration as well as facilitate harvesting. To achieve optimal yields, both types of raspberries should be fertilized in the spring.

Raspberries in general tend to spread out and the growth can be controlled through pruning or the use of a lawn mower.

Blueberries



Blueberries prefer an acidic soil of 4.8 (pH) and this is usually the first step to consider when planting. Acidifying the soil (through incorporating elemental sulfur or aluminum sulfate) months before planting is ideal. Because blueberries don't have root hairs (unlike most plants), they benefit from a thick layer of organic mulch and drip line irrigation. Plant at least three different varieties to

ensure adequate pollination. Harvest when the berries are fully colored; they will not ripen off the plant if harvested early. Birds can be a problem and netting is the most effective way to prevent crop loss. Fertilize the blueberries in the spring for optimal yields.

Prune the oldest growth in the winter and prune to allow maximum sunlight penetration and airflow into the core of the shrub. Once established, pruning out ¼ of wood (prune only the oldest wood) each winter will increase fruit yields and quality, as well as the plants' longevity.

Strawberries

Strawberries are a great crop to grow and children especially enjoy the harvest. A well-drained, fertile soil with a pH of between 6-7 is a great start. We recommend planting bare-rooted seedlings as opposed to potted plants; this is timely however and can only occur in the spring around April/May. We advise buying from Nourse Farm in Western MA. Although they are not organic, we prefer Nourse's nursery stock because of their quality, consistency, and lack of disease/viruses. The soil must be prepared before seedlings arrive and they should be planted as soon as possible after they are received via mail. When planted, drip line irrigation is recommended for optimal growth and yields.

There are two main types of strawberries; day-neutrals and June-bearing. June-bearing varieties only produce berries in June where as day-neutral strawberries produce small quantities of berries throughout the whole season. We recommend a combination of both kinds of producers.

Day-neutrals produce berries the first season they are planted. Pinch off all the flowers for the first six weeks to insure proper root development. They will produce the second season as well and should be pulled out after the second season. Day-neutrals are slightly more tolerant of lower light conditions where as June-bearing varieties require full sun.

June-bearing strawberries produce berries the second and third season after being planted, yielding nothing the first year. It's better to pinch off all the flowers the first year to encourage root and leaf development. After the second year of harvesting, it's advised to pull out the crop, as production will decrease. June-bearing strawberries will produce runners, or new plants attached to the main plant via above ground runners.

When planting, space each strawberry plant about one foot apart. Push the runners into the ground and allow for consistent spacing. For both varieties, fertilizing should occur in the spring, about 2 weeks after planting, as well as in September. This fall fertilizing will promote flower bud formation, increasing yields the following season. Strawberries are one of the only perennial crops that should be fertilized in the fall; fertilizing other perennials in the fall will lead to winter injury. Mulching the berries will help control weeds and retain moisture. In the early winter, after the crop has been exposed to a few frosts, mulch over the entire crop, including the leaves, to help protect the plants from the harshness of winter. In spring, remove the mulch and enjoy the harvest!

Grapes

Grapes love heat and lots of sun and 10 hours of light is ideal. Concord grapes, and French hybrids can be grown in the Massachusetts area successfully. Grapes have root systems that can go down ten feet and must be planted in well-drained soil with a neutral pH. As with most perennials, there must be a proper balanced reached between vegetative growth (leaves) and fruiting growth. If there is too much vegetative growth, fruiting will decrease. This is part of the reason why we must prune grape vines in the winter. Decreasing plant vigor allows more energy to go towards the fruit. Sunlight reaching the fruit (which would otherwise be shaded by leaves) increases the quality of the grapes as well as sugar content.

Many commercial grape growers intentionally 'starve' their grape vines to limit excessive vigor. Through limiting water and nutrients, growers can force the energy into grape production. This is why growing in very fertile soil is not a good idea; too much growth=less grapes. One grape vine can grow forty feet in one season, however when pruned to a much smaller space, it will actually produce more grapes, and of a higher quality.

Fruit tree care & pruning



Fruit trees are satisfying and fun to grow, however regarding maintenance they are on the more difficult end of the spectrum. They require full sun (8-10 hours), very well drained soil with a neutral soil pH. Without complete full sun or deep, well-drained soil, we do not recommend growing fruit trees.

Because of our New England's humid climate, fungal diseases are common and need to be addressed as soon as the problem arises. Unfortunately, spraying fungicide is sometimes the only way to control these diseases. Copper, lime and sulfur, known as Bordeaux mixture, is the most common organic fungicide used in orchards. When spraying this, one needs to be wearing a hazardous material suit and respirator during the application, and the agent itself causes phytotoxicity problems

with the fruit tree leaves (expect the foliage to look ugly for a couple weeks after application). If an appropriate site is chosen, and the varieties selected are disease-resistant, spraying can be significantly reduced or avoided altogether.

Despite the kind of tree fruit, each variety will mature to a different sized tree. The size of fruit trees is largely determined by its rootstock. Dwarfing rootstocks are ideal in some cases and because the trees only get 10 feet tall, they are easier to manage and can be planted very close together (3-4' apart). Fruit trees on dwarfing rootstocks come into production much earlier than larger, freestanding fruit trees however these smaller, more productive trees need to be supported with a trellis. Trees on semi-dwarf rootstocks can get about 22 feet tall, making pruning, harvesting and spraying more cumbersome. Adequate space between trees is essential to avoid overcrowding.

To encourage early production from newly planted fruit trees, we do not recommend doing any pruning for the first two years following planting (if there are two competing leader branches, one can be pruned away when the tree is young). Once production begins, pruning in February or March is ideal. The type of fruit, variety, rootstock, and training system will dictate your style of pruning.

In general, tree location and pruning must allow for maximum sunlight penetration and airflow, which will help to prevent lingering moisture associated with disease. Shade is the enemy of fruit trees! "Sunlight is the best fungicide" is a quote worth internalizing if you are interested in growing tree fruit and every correct pruning cut equals less fungicide to be sprayed. Sunlight reaching the core of the tree will also stimulate flower bud formation and result in higher yields and fruit quality. Sun reaching the fruit is responsible for coloring and increased sugars and flavor.

As with all fruiting plants, to achieve optimal yields, there must be a balance between leafy growth (vegetative) and fruiting growth (reproductive). If there is too much vegetative growth, fruiting will be lessened and if there is too much reproductive growth, the fruit will be stunted and poor quality. Pruning helps to achieve the ideal proportion of leaf area to fruit, to allow large yields of quality fruit.

In general (for apples, pears, cherries):

- Remove two or three of the largest limbs in the top two-thirds of the tree.
- Remove any branches that are more than half the diameter of the main leader.
- Avoid making heading cuts; instead, remove the entire limb.
- Remove downward-hanging branches.
- Remove vertical shoots.
- Leave one shoot as a central leader and do not prune it. Maintain the central leader!

Branches that grow vertically are called suckers, and they only produce leaf growth, never with any fruit. Horizontal branches or downward growing branches mainly produce more vertical shoots or suckers, not contributing to fruit. Branches at a 60-degree angle from the main stem produce the most fruit. Limb-spreaders, rubber bands, toothpicks, weights, wires and many other objects can be used to manipulate tree growth to achieve the ideal 60-degree angle. If a branch is too long, it may snap from supporting too much fruit and should be shortened. Ideally, no branches should be crossing or touching each other and airflow is a priority.

Peaches are different than apples, pears and cherries, in that peach trees don't have a central leader, but rather an upside down pyramid shape consisting of four main branches. All the peach branches smaller than a pencil width should be pruned away.

When pruning, it's important to not prune too much off at one time. If you're approaching an old apple tree that hasn't been pruned in years, it's better to prune the tree to an ideal size over three years. If pruned too much at one time, trees will put all their energy into vegetative growth (vertical shoots), pruning the following year will be more difficult, and fruiting will be lessened. When approaching a neglected, mature

fruit tree, the first cuts should be large cuts in the center of the tree to allow maximum light. Then the next year, more detailed cuts can be made.

From spring pollination to fall harvest, watching tree fruit develop and mature is exciting and very rewarding.

Insects

Healthy, well cared for plants are less likely to be attacked by insects. An abundance of flowers surrounding your garden will help with pollination as well as attract beneficial insects, which prey on harmful insects. Over or under-fertilizing, water-stress, winter injury, and general neglect will exacerbate insect damage. A diverse garden with well cared for plants will naturally fend off against insects pretty well, however some human intervention might sometimes be necessary.

Certified organic products such as Diatomaceous earth, Actinovate, Neem oil, and insecticidal soaps can be applied when signs of destructive insect damage are present. An early or preventative spray application is more effective than waiting until pest populations are high.

In some cases, minimal crop damage is acceptable and doesn't really affect the overall quality of the produce. For more detailed information about insects and the proper control measures, consult our recommended further reading sources at the end of this manual.

If you get aphids on your kale in the fall, this is very common. Applying insecticidal soap when the problem is first noticed will help. You can wash the insects off the leaves

before consumption as well. Observation of your crops will help you spot the insects before they do significant harm.

Some pests that gardeners should especially watch out for include aphids, squash vine borers, Japanese beetles, flea beetles, raspberry fruit fly and fruit worm, blueberry maggot, Colorado potato beetle and potato leaf hopper. Troublesome insects can be manually squished, or sprayed with organic insecticides, which will decrease the insect populations if controlled in time.

The following general practices will help prevent harmful insect damage to specific crops. Clean up and compost or remove the pruning material/debris from your raspberries and other trees or shrubs. Otherwise, insects can overwinter and cause problems the next season. Improve air circulation with your blueberry bushes to help prevent blueberry maggot problems. When growing plants in the squash family (cucurbits), don't mulch the plants with organic matter, as squash bugs and striped cucumber beetles like this mulched environment and may proliferate.

When growing Brassicas such as broccoli, cauliflower or kale, avoid growing them in the same place the whole season. For example, locate your fall crop in a very different area than your spring crop to make it more difficult for harmful insects to feast on your plants. Try to get in the habit of diversifying and rotating your crops just only from season to season, but rotate crops within the same season.

Gardening will teach you a lot about the surrounding natural environment. When growing only one crop, such as a lawn, the natural balance of insects is disturbed. The best way to prevent insect damage is to diversify the plants in your garden. Different insects are attracted to specific plants and repelled by others.

Photos courtesy of <http://extension.umass.edu/vegetable/soil-crop-pest-management/insects>



Aphids



Japanese beetle



Colorado potato beetle



Squash vine borer



Striped cucumber beetle



Raspberry/blueberry fruit fly (Spotted Wing Drosophila)



Flea beetle

Disease

Healthy plants are less likely to obtain a disease and we like to avoid ever having to spray pesticides, even if they are organic. Healthy soil, adequate moisture, excellent drainage, aerated soil, and ample airflow and sunlight penetration will help to prevent most diseases. In general, bacterial diseases can be seed born and insects can transmit viruses. Selecting seeds and seedlings from reputable nurseries is always ideal. Sometimes gardeners like to trade plants; be careful as these plants may introduce insects or new diseases into your garden.

Proper site selection and choosing disease-resistant plant varieties is the best approach to preventing disease. A fruit tree growing in partial sun and poorly drained soil will likely acquire a disease. If a fruit tree is getting full sun, in well drained soil, and has been pruned to maximize air flow and sunlight penetration, that tree will dry out faster and thus limit the odds of becoming diseased.

A small amount of disease is normal and may not hugely affect crop yields. For example, most cucumber and squash plant will acquire white fuzz on the leaves called powdery mildew. Powdery mildew is the only fungal disease that doesn't require a film of moisture to be present; humidity alone will promote powdery mildew, making it very common and hard to control.

Squash should be planted in succession to achieve a longer harvest. Ideally, while the old squash plants that have powdery mildew are slowing down in production, your new plants are disease free and beginning to come into production.

Tomatoes will likely get a disease called early blight on the lowest leaves. These infected leaves can be pruned and discarded. If problems persist, certified organic fungicides such as Actinovate or Serenade could be sprayed. If weather is too wet, disease will be inevitable and spraying won't help. In general, some plants may suffer and some will thrive. Cherry tomatoes seem to fend off better against blight. Because of their fast growth habits, they seem to out-grow the disease and although infected, they still often produce substantially.

Although it's not ideal, you should expect to see disease in your garden. We live in a wet climate and some years certain crops will thrive, and some years they may not. This brings us back to the idea of biodiversity equaling resilience.

Imagine a natural forest setting that humans have not influenced. Some plants have a disease however the majority of the plants are healthy. Nobody fertilized, weeded, sprayed or irrigated the forest and yet most of the plants are healthy and thriving. Remember how nature organizes itself and you'll be able to achieve success with the least amount of work necessary.

Whatever the disease, to be sure, sending tissue samples to be analyzed by a university plant tissue lab is the only way to know for sure what you're dealing with. In general, employ crop rotation to avoid having the same crop in the same place year after year.

Below are a few more common diseases in this area:

-Basil downy mildew is becoming more common and often causes problems in the second half of the season. Because of this, we recommend you plant Basil as soon as

frost is no longer a problem and harvest the crop quickly before the downy mildew occurs.

-Fire blight and apple scab are serious fruit tree problems. To avoid having to spray fungicides, select resistant varieties and cultivars.

-Peach leaf curl and peach canker are common and can be effectively pruned away and discarded. Sterilize the pruning equipment with rubbing alcohol to avoid spreading the pathogen.

-Damping off can occur with young seedlings such as lettuce. This fungal disease often occurs from wet conditions and poor draining. If you notice young plants wilting and struggling even with enough water, reduce your watering and use less fertilizer; you could be over watering.

Animal pests

Critters can pose problems for edible gardens, however in our experience, they aren't as problematic as one would think. Counterintuitive as it may seem, critters seem to first eat the plants that are the least healthy, so keeping your plants happy and healthy can help prevent some critter damage.

Squirrels and rabbits are everywhere and sometimes nibble on kale or chard, however usually don't do significant damage, except in cases involving peaches, strawberries and some other fruit. Groundhogs and deer, however, can decimate edible gardens especially those that are newly established. The most efficient and cost-effective way to

keep out destructive critters is through using an electric fence. Electric fences can be powered through solar panels, are relatively inexpensive, and can be easily taken down when not needed. Critters can find a way to dig under or climb over most non-electric fences. Deer can jump over seven feet, and installing a seven-foot fence can be expensive and look intrusive. We recommend a smaller, 3-5' electric fence, which is baited every couple weeks. The concept is simple; the groundhogs or deer are attracted to the bait, then get shocked by the fence, and hopefully never return.

We generally don't install fences around our gardens (unless we know there is constant deer/groundhog activity) because they are an added cost, are hard to make look attractive, and sometimes aren't needed at all. If significant damage is occurring, then we consider the fence option, however we usually wait for the damage before installing a fence.

In regards to other forms of critter control, many other techniques can work with varying effectiveness. Applying organic hot pepper sprays can be a useful, short-term solution, as well as scattering human or dog hair around the plantings or in the paths. Products such as synthesized 'coyote urine' can be applied around the garden and other aromatic deterrents can sometimes be effective. Many garden centers sell multiple inexpensive pest deterrents. Simply having a dog present will likely keep all critters away from your garden.

Sometimes, planting aromatic plants around the garden can also help deter critters. Some of these plants can include lavender, sage, chives, thyme, basil, onions, garlic etc. Perhaps squirrels want to eat your tomatoes, but not the onions and basil planted around the tomatoes, which then act as a protective aromatic barrier to critters.

Birds, with regards to blueberries, strawberries and grapes, are best controlled through the use of nets draped over a simple cage (built with stakes). Other methods of

preventing bird damage can include bird scare tape, scare balloons, and audio birdcalls or exploding cannons (for those with neighbors far away).

Using multiple techniques and constantly monitoring the garden for signs of entry is the best approach for managing animal critters.

Storing and preserving

Most of your produce will be eaten while fresh, however sometimes preserving and storing the abundance makes sense. Upon harvesting upon harvesting, you can clean most of the soil and less-desirable leaves. Putting your harvested bounty in the refrigerator as soon as possible maintains freshness and vitality. Don't put your tomatoes in the refrigerator, however, as this negatively affects flavor and storability.

If you have a glut of one type of crop, consider preserving the crop. Cucumbers and beans can be pickled and enjoyed over the winter. Apples, pears, peaches and other tree fruit can be made into jam and chutney. Broccoli, beans, peas and many other veggies can be quickly boiled in hot water or braised, and then stored in the freezer for months, still retaining quality and nutrients.

The end of the growing season

In our climate, there comes a time when fun in the garden must come to a temporary end. Sometime in late October or November, we'll experience a frost and all the frost-sensitive plants in the garden will perish. This includes, beans, tomatoes, peppers, squash, basil etc. Right before the first frost, harvest all the frost-sensitive crops from the garden, including tomatoes that aren't fully ripe (they'll ripen indoors if you put them in a paper bag with other ripe tomatoes or bananas).

Some plants are hardy and will survive a few frosts without protection, such as broccoli, cauliflower, carrots, beets, spinach, and some types of greens. As it gets colder at night, harvest these crops, as a heavy frost will kill these plants too.

Perennials will be just fine and you can let them be until spring. We think a healthy layer of mulch around all perennials is a good idea. Leaves from your deciduous trees make great mulch and can be raked to the desired location, then mowed to create a uniform layer, still allowing water to percolate through. The mulch helps to moderate soil temperatures, preventing winter injury; fluctuating temperatures in the late fall and early spring decrease a plant's cold-hardiness and leads to stress. Some gardeners like to mulch the entire garden, including any area that is bare, however this is optional.

If you've used tomato stakes, cages, or trellis systems, the late fall is a good time to dismantle these systems and store them until spring. Clay pots should also be put inside, as the cold will cause them to crack.

Some gardeners like to remove and compost all the remaining dead plant debris, however this too is optional. If you have diseased plant material, plant pathologists recommend discarding the debris at the end of the season and not adding it to the

compost pile, which can perpetuate the inoculum. Some gardeners just leave the garden be, and the plant debris will decompose on its own; this is more of an aesthetic decision. Perennials can be cut back and pruned at the end of the season, however this

too is optional. Some herbaceous (non-woody) perennials look nice when poking out of the snow; many of the maintenance decisions in the late fall are optional.

Extending the growing season

Here in New England, although we have enough sun to grow many crops, it never seems to be enough. There are ways to extend the harvest and for those who love cold hardy crops such as broccoli, spinach and other greens and herbs, this may make sense for you. If you have excellent southern exposure in winter and want to experiment with extending the growing season, we recommend looking into getting a cold frame or greenhouse.

Cold frames are like miniature greenhouses, which are used to extend the harvest of cold-tolerant plants such as greens and herbs. Cold frames look like raised beds, angled south, with a transparent lid that lets light reach the crops. The concept is pretty simple behind growing in the winter; nothing really grows in the winter. Even with a



cold frame, very little growth will occur from November-March. Effort should be made to establish greens, herbs or cold hardy plants in the fall, when there is still some light in the sky. Once established, the cold frame or green house acts like a large refrigerator, which keeps the plants alive through the season. As soon as more light reaches the greens around March, the greens will grow quickly and vibrantly, providing you with an early spring harvest of seeds you sowed in September.

Cold frames or a larger greenhouse can also be used to start your own seedlings. Inside the greenhouse, row covers can be used as an additional line of defense and carrots, beets, and other cold hardy plants can be grown overwinter with no heating. Greenhouses can be heated, which opens up more options in terms of winter production. At times in the late fall, winter, or early spring, temperatures can get too hot inside the cold frame or greenhouse. Hot temperatures can kill the greens and automatic ventilation systems can be installed, which open and close according to the

indoor temperature of the structure. The greenhouses or cold frames that we install usually have automatic ventilation built in.

There are many materials and designs to consider when extending the growing season. Simply draping cloth row covers over cold-hardy plants is the cheapest form of season extension and will allow plants to survive into the early winter. Using thin, inexpensive greenhouse plastic (make sure it is designed for greenhouse use) and metal or plastic hoops, you can make protective tunnels over your crops. This concept can be small and protect individual rows, or large enough to walk into. Either way, unfortunately, the plastic only lasts about three years. Twin wall polycarbonate is an excellent insulation material that allows sun penetration and superb heat retention. This is the material we often recommend because it is durable, lightweight, and lasts 30 years. Glass is the most permanent form of solar heating, however because it only has one pane, it doesn't retain heat as well as twin wall polycarbonate.

It's really exciting to go outside in the middle of winter and harvest a salad and extending the growing season is relatively easy if you get an early start in the fall.

Recipes (HomeHarvest originals)

A lot of the produce you harvest will be eaten fresh, while meandering through the garden. For the produce that you want to cook, the following recipes are quite scrumptious. In general, vegetables tend to taste great when cooked with high quality fat such as butter, Olive oil, bacon fat, lard etc.

Benny's Buttered Basil Beans

Green beans

Basil

Butter

2 tablespoons soy sauce

2 tablespoons minced garlic

Hot pepper flakes or fresh hot peppers

Steam a few large handfuls of fresh beans until they are about halfway cooked. Drain the water or allow it to evaporate and then add two tablespoons of minced garlic, half a stick of butter, and two tablespoons of minced hot peppers (to taste). Stir the beans to prevent burning. When almost finished cooking, add three tablespoons of soy sauce and a large handful of minced basil. Enjoy!

Maggie's Spring Green Soufflé

This is a great recipe to make when you have too many greens in your garden and you can't eat all of them fresh in salads.

4 C. fresh mixed greens washed. (Lettuce, arugula, kale, chard, spinach, etc)

4 eggs

1 -bunch scallions, finely chopped

1 C. fresh herbs of your choice (whatever you have in your garden)

1 C. crumbled feta cheese (you can substitute other cheeses like grated cheddar, Monterey jack or Swiss)

1/2 t. hot pepper flakes

1 t. salt

1/2 t. ground pepper

Blend all ingredients until smooth in food processor. Pour into greased 9x12 baking dish. Bake for 45 minutes at 350 degrees or until inserted knife comes out clean. This soufflé can be eaten hot, cold, room temperature or frozen and eaten later.

Ruby Chard

1 pound ruby chard

2T. Olive oil

1 minced red onion, minced

1/3 C. balsamic vinegar

Lightly- roasted chopped walnuts (optional)

First, wash and cut stems off of the ruby chard. Mince stems, add onions and cook in olive oil stirring for about 5 minutes. Put them aside and remove them from the pan. In the same pan, pour balsamic vinegar and bring to a boil. Turn the heat to very low and simmer for 10 minutes. In same pan, put coarsely cut chard leaves and cook stirring until tender.

Place cooked leaves in serving bowl, place stems and onions on top and sprinkle chopped walnuts on top. Salt and pepper to taste. There will be a beautiful contrast between the green leaves and the red stems in your dish.

Kale with Garlic and Fresh Ginger

1 bunch fresh kale

2 T. olive oil

2 cloves minced garlic

1" fresh peeled ginger, minced

Wash and cut 1 bunch of kale into course pieces. Put into frying pan and add 2 T. water and steam covered for 15 minutes on low heat.

Add olive oil, garlic and fresh ginger to pan and sauté with kale for 5 minutes. Toss and add salt and pepper to taste.

Children and agriculture

We're always amazed how much children enjoy gardening once they start. The trick is to make gardening into a fun game rather than a chore. In our experience, kids who initially hate vegetables soon learn that they love eating what they have grown themselves. Sweet peas, potatoes, beans, cucumbers, strawberries, cherry tomatoes,



mint, basil, raspberries, blueberries, grapes, peaches, apples and plums are a few of the crops that children seem to especially enjoy.

Kids really enjoy the sense of ownership and pride they experience from gardening. Let them be in charge of an area in the garden, or the whole garden itself. Let them take care of the plants, watch them grow, and harvest the bounty.

Harvesting some peas for dinner may seem like a simple task, however the positive influence of exposing children to sustainability at an early age is significant.

“Setting an example is not the main means of influencing others; it is the only means.” Albert Einstein

Patterns in nature

Many of the same patterns on a microscopic level are also present on a much larger, universal level and the simple act of gardening can help us be more in touch with nature's rhythms. Nature has a beautifully simple way of building upon itself.



The Fibonacci sequence is a fascinating series of numbers that is evident throughout nature and most plants and animals evolve and grow according to this sequence. Add these numbers in order and this pattern is easy to understand. $1+1=2$, $1+2=3$, $2+3=5$, $3+5=8$ and so on. The pattern is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144... When graphing these numbers according to size, logarithmic spirals result.

When dividing a number of the sequence by the previous number (especially as one gets higher in the sequence), the ratio of 1:1.618 is apparent. This is referred to as the golden ratio and is evident almost everywhere in nature.

The way sunflower seeds diverge from the center is consistent with the Fibonacci sequence

examples are common throughout plant evolution. **Fractals in cauliflower growth and the way mushroom clouds form; entire galaxies swirl around in a spiral in the same way cream blends with our coffee or mushrooms grow from your compost.**

Have you ever wondered how a tree grows so high, and yet remains completely balanced and upright? The logarithmic spirals produced by the Fibonacci sequence allow plants to be perfectly balanced. The proportions of our own fingers, arms and body parts are generally in line with the golden ratio. Once one is aware of these proportions, they start appearing everywhere.

"Nature is the best teacher. It's been said that nature holds the original patent on every human invention. If we look to the way nature does things, we'll get the most efficient, energy-conserving, and beautiful result." -Michael Schneider

Allow your garden be an ever-changing outdoor classroom and you'll constantly be learning.

About the business/author/ending thoughts

"Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals, and happiness."

-Thomas Jefferson



We hope you enjoyed reading through this HomeHarvest maintenance manual and we hope you learned useful and practical information.

I get so excited when I see people growing their own food. It's one of the most positive things we can do for our environment and ourselves. There is such immense satisfaction in tending to your plants, watching them thrive and mature, harvesting the bounty and sharing the harvest

with friends and family. This is what humans evolved to do. Reconnecting with where our food comes from is profound and in need.

-Ben Barkan, founder/owner of HomeHarvest

Every time you harvest something from your garden, you're contributing to the world more than you can imagine. Those beans you just harvested for dinner could have been grown unsustainably on a large monoculture farm halfway across the world. Those beans could have been sprayed with fungicide, herbicide, insecticide, and fertilized with chemical fertilizer, causing enormous harm to the environment. The beans could have changed hands several times and traveled on several boats and trucks before landing in a large refrigerator in a grocery store. Those beans could have been weeks old before you bought them, lacking vitality and nutrition. **But NO, you grew those beans yourself!** You sowed the seeds, watered the seedlings and watched them grow. You saw bees from your own neighborhood pollinate those small bean flowers. Then, you harvested the beans and immediately ate them for dinner. You grew them and they grew you. This simple, relaxing and freeing act took just minutes at the end of the day, and yet think of the positive repercussions. Be proud of those beans!

Imagine if everyone you knew had the experience of growing his or her own food. What would be different?

We hope you enjoy the many bounties of your garden many times over. We hope your garden continues to thrive and provide abundantly for you. We hope you continue to learn and master growing everything you want to grow.

Our Mission Statement

HomeHarvest designs, builds and maintains high-yielding and beautiful edible gardens in the Greater Boston area. Applying organic and sustainable techniques, the produce from our gardens is fresh, vibrant and nutrient-dense. We love teaching people about

our natural and holistic approach to farming so they can enjoy stewardship of their gardens.

Check out our website for more information and tips related to gardening and sustainability. www.homeharvest.biz

“The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings.”

-Masanobu Fukuoka, natural farmer and author of *The One-Straw Revolution*

Suggested reading

Gaia's Garden: A Guide to Home-Scale Permaculture - Toby Hemenway

Organic Gardener's Handbook of Natural Pest and Disease Control: A Complete Guide to Maintaining a Healthy Garden and Yard the Earth-Friendly Way- Fern Marshall Bradley

Teaming with Microbes: The Organic Gardener's Guide to the Soil Food Web- Wayne Lewis

Perennial Vegetables: From Artichokes to Zuiki Taro, A Gardener's Guide to Over 100 Delicious, Easy-to-Grow Edibles- Eric Toensmeier

Edible Forest Gardens (recommended for serious gardeners interested in long-term perennial agriculture systems) –Dave Jacke and Eric Toensmeier

Four-Season Harvest: Organic Vegetables from Your Home Garden All Year Long - Eliot Coleman

The One-Straw Revolution-Masanobu Fukuoka (an inspiring story about natural farming)

The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener- Eliot Coleman

Carrots Love Tomatoes, Louise Riotte (a great book about companion planting)