THE COMPANION PLANTING SOIL MATES GUIDE

includes a PLANTING CHART

and GARDEN PLANNERS

CHRISTO SULLIVAN

THE COMPLETE BEGINNERS' GUIDE TO
GROWING AN ORGANIC, HEALTHY AND BOUNTIFUL GARDEN
WITH AN EFFECTIVE PLANT-PARTNERS STRATEGY

purposes only and are owned by the owners themselves, not affiliated with this document.

Introduction

A healthy and fruitful garden requires more than soil, sunlight, water, and fertilizers. What to plant close together and what to plant far apart depends on how many areas you have available and whether or not your plants can benefit from each other.

Some of life's worst aspects can be avoided by surrounding yourself with supportive friends. Even your plants know this! Companion planting is the practice of cultivating two plants near together for the benefit of one or both. One-sided or reciprocal benefits are therefore possible. To attract pollinators, plant nectar-rich flowers among the crops, or plant two vegetables to repel and confuse pests.

In Native American villages, the Three Sisters trio—climbing beans, maize, and winter squash—were typically grown together due to the plants' complementing characteristics: the tall corn supports ascending beans, the close to the bottom squash covers the ground to minimize moisture loss, and its huge, prickly leaves deter pests and weeds; and the quick growing beans are 'nitrogen fixers,' rendering nitrogen accessible to other weeds and pests.

Oaxaca, Mexico, was home to squash, wild beans, and teosinte for 12,000 years before humans cultivated crops. When hunter-gatherers began cultivating wild plants for nourishment, indigenous peoples began forsaking their nomadic lifestyle and began cultivating these plants for a more stable food supply.

Domestication of the first of the three occurred approximately 10,000 years ago. In the beginning, it was grown for its strong rind, which was used to manufacture utensils and bowls, and later for its nutritious seeds. Squash was originally bitter, but it was eventually improved by indigenous peoples.

The wild ancestor of maize is teosinte, according to legend. Some 9,000 years ago, the Mayans domesticated this grass, which had a 12-kernel seed

head, into a useful and delectable crop. There have been many varieties of maize cultivated since then, with more genetic diversity than many other plants.

The common bean can be found throughout Mesoamerica and the Andes of Peru. For the past 7,000 years, a vine with coiled seedpods and little seeds has been selected and bred to produce greater seeds and bush development.

As in farmer's almanacs and other forms of garden wisdom, companion planting is generally based on observation. What works best for one person may not work for another. To make better plant selections, it may be helpful to view the garden as a biodiversity system where plants are interconnected and dependent on one another.

Chapter 1: Companion Planting Basics

I'm sure there will be a brilliant and magnificent row of marigolds, or possibly a nasturtium meandering through the vegetable garden in your imagination. If I were to ask people if they grow basil with their tomatoes, most would gladly say yes.

For a plant to thrive and grow, it must be paired with a compatible companion. As a result, gardeners and farmers can cultivate an ecological community in which all plants are mutually beneficial to the garden and its inhabitants.

Companion plantings can be cared for in the same way as your regular garden. Soil preparation, planting at the appropriate time, and watering and fertilizing as needed are all still required.

1.1 REASONS TO GROW ORGANICALLY

Sustainable plant development for the benefit of the entire ecosystem is at the heart of organic growth.

Reasons:

Chemical pesticides and herbicides, including the infamous Monsanto chemical Roundup, are a hot topic. Many countries are considering outright banning certain chemicals in response to lawsuits alleging they cause cancer. They are based on mounting evidence that these harmful substances can be carried on to children, taint rivers, and serve as disease-causing substances with sufficient exposure.

Organic insecticides and biological control agents have seen an upsurge in demand due to these results. Healthy bacteria and fungi outcompete dangerous pathogens in a well-balanced ecosystem of soil microorganisms and fungi. Step three is integrating pest management into the overall plan of action.

An integrated approach to pest management aims to reduce and prevent pest infestations. Companion planting is a practice that is included.

Symbiosis & Ecosystems

The greatest method to solve difficulties is to work with others as a group. It's the same in nature. Symbiotic, or mutually advantageous, connections abound in natural ecosystems where plants and animals can survive. Remora fish and a shark are an excellent illustration of an odd pairing.

Good bacteria and helpful fungus nourish their host plant in the soil, for example. Your plants are protected from illness and stress by a hidden network of microorganisms.

Deterrence of Pests through companion planting

Many intriguing methods help companion plants keep pests at bay.

Masking - companion plants can interfere with pests' biological receptors and prevent them from recognizing and attacking your plant. To prevent mating and feeding behaviors

or to simply drive pests away from these plants, the plants emit compounds that do so

Complimentary plants, known as "trap plants," can bring pests in and then eradicate them. The poisons in some trap plants can also kill the insects attracted to them.

By offering food and shelter, companion plants might attract pests' natural enemies. Ladybugs and hoverflies are attracted to the long-rooted yarrow plant, which is sometimes employed to control aphid numbers.

Common Companion Plants

Incorporating the following plants into your growth plan has been demonstrated to be effective in repelling pests:

Basil-The pleasant aroma of basil deters a wide range of insects, including aphids.

Marigold-Insect pests such as nematodes and leafhoppers are deterred by the presence of marigold.

Sunflower-its spiral pattern and bright color deter pests, and they are more resilient to infection than cannabis plants

Rosemary-like basil has the potential to keep mosquitos at bay.

Mint-Pests such as aphids and ants, and mice are scared off by the menthol in mint plants; therefore, it's better kept in a pot near your plants instead of in the soil itself.

White Mustard-combats nematodes and can be used as a biofumigant in the soil.

Dill-Repels spider mite is a leading cause of cannabis-related illness.

Preventing Resistance

Insects don't build resistance as fast as companion plants, which makes them an excellent tool for pest management. Resistance to synthetic pesticides is easy to develop because they often rely on a single chemical ingredient. These natural sources often contain a variety of essential oils and other compounds. These form a formidable defense that can't be beaten easily.

Beyond Pest Control

Many aspects of organic and conventional farming are distinct. Consider the social and environmental effects of your actions when you raise organic food. They avoid problems like extreme monoculture by following strategies that benefit the environment as a whole.

A lack of nutrients in the soil is caused by the cultivation of a single crop repeatedly. Poor yields and harvest quality can also

be caused by a microbial imbalance. The microbes in your soil are like a secret army trying to keep your plants strong and healthy.

Soil conditions and crop yields can be improved by using companion plants. New plant species boost the diversity of bacteria and fungi, which has long-term positive effects.

1.2 THINGS TO KEEP IN MIND WHEN COMPANION PLANTING

Before planning the layout of your garden and making plant selections, learn a few facts about it.

Knowledge of Local Weeds

You should familiarise yourself with the weeds in your area so that you know what is regarded as noxious and may need to be eradicated. Weeds that attract hazardous insects and those that attract benign predators are equally important to know.

Soil Testing

Whether or not soil conditions suit a plant's specific requirements determines whether or not the plant will struggle

or prosper. Soil testing is a must if you want to know what to plant there.

Plant and Seed Supplies

Finding a reliable nursery with an extensive selection of plants appropriate for your region would be challenging. It's also critical to find a source for organic seeds. Fortunately, there are several online and mail-order companies to choose from.

Having done your research and collecting the relevant information, you are now ready to create your "organic" companion-planted garden.

Seasonal Diseases

Learn about the diseases that may impact the crops you grow. You'll know how to respond to them if they ever do.

Feral Animals

Depending on where you live, you may have to deal with various feral animals. Quite a few of them feast on your prized crops, believing they

have been planted specifically for them. Wallabies, possums, kangaroos, fruit bats, and parrots are among the creatures drawn to fruits and vegetables in my region. Then you may have to think about fencing your crops or using bird netting, etc., to protect them.

Suitability to Local Climate

A favorite vegetable or fruit doesn't mean it's a good fit for your environment because you enjoy eating it. It will be stressed and have a hard time surviving if it isn't the right fit. Because of this, if you select the proper plants for your environment, you will save yourself both time and money.

Climate Awareness

When it comes to the seasons, dates on the calendar aren't always accurate. Temperatures in your location could arrive earlier or later than expected. A few weeks earlier than the official start of spring is not uncommon in my area, for example. The duration of your regional growing season and the likelihood of frost, snow, or severe rain are all things you should be aware of.

Seasonal Cycles of Pests

You must be able to recognize pests based on their appearance and behavior, as each season brings a distinct type of pests. You can be better prepared for bugs if you know what to expect. Insect-repellent companion plants should be placed near crops that are susceptible to specific pests.

Growth Rates And Maturing Times

If you know how different species grow, it will be much easier to place your plants. To reduce disease buildup in the soil, a crop rotation strategy should be devised.

1.3 COMPANION PLANTING BENEFITS

The advantages of companion planting and how these planting tactics can help your garden thrive should be considered when developing your garden planting plans.

Reduced weed pressure

Herbicide-free weed control may be another advantage of some companion planting techniques. It is possible to utilize allelopathy to control weeds in the garden. By crowding and shading out weeds, companion plants can act as living mulch.

Reduced pest pressure

When it comes to companion planting, insect control is the most sought-after benefit. Researchers have spent years studying everything from how pests discover host plants to how they may lure them away before they can cause considerable damage to crops in order to protect them. In order to minimize damage to vegetable gardens, companion planting employs a variety of strategies, including attracting, trapping, fooling, and discouraging pests.

Gardeners, soil, and our ecosystem all benefit from companion planting because it encourages plant diversity. As a result of plant diversity, we see a drop in parasites and increased beneficial insects. Many plants can be grown in harmony, and the results are numerous.

Improved biological control

Companion planting increases the quantity and diversity of beneficial insect species that eat common garden pests or utilize them to feed and house their developing young, another benefit of specific companion planting methods. Increased biological management in the garden can be achieved by pairing plants that lure and nurture pest-eating insects. As well

as providing the insects with pollen and nectar, companion plants can help build a habitat for these "good" bugs. "Banker" plants, which are purposely produced to support and attract pests, can also be used as a food source for beneficial insects when pest numbers are low in crops. Insects are more likely to stick around if they have a cause to do so. Several studies shed light on how to keep pests and the insects that assist manage them in a healthy balance.

Attracting Natural Enemies

Companion planting attracts beneficial predatory and parasitic insects to the garden, which is one of the most obvious ways it helps control pest damage. These are referred to as "natural adversaries" by some people. Knowing that the enemies of my foes are also my friends is easy when you watch a killer wasp pulling a cabbageworm over the ground.

Imported cabbage worms and cabbage loopers, as well as aphids, can be targeted by predatory or parasitoid insects, as well as larger moth larvae. When you plant "insectary plants,"

or those that attract predatory and parasitic insects, natural enemy helpers can breed, hide, and feed in your garden. This will allow them to do their job.

Your pest-control partners include the easily identified ladybug, hoverfly, and parasitic wasp. However, keep in mind that you may not be able to tell the difference between their larval and adult forms, so you should avoid killing any bugs you haven't seen before.

Reduced disease pressure

Companion planting is being investigated as a possible method of preventing some plant diseases. The interplay amongst disease organisms and the crops they impact can be influenced by specific companion planting tactics, even though this area of companion planting appears to be

less explored than others.

Saves space

It's ideal for those who have a tiny garden and want to maximize their space. A common method of using companion planting to save room is to place a vine under a taller plant. Space that would normally be left unused or overrun by weeds is now put to good use. Fast-growing crops can also be planted between rows of slower-growing ones. Green onions and Radishes are two of my favorite plants to grow in our garden. They may be grown in almost any location and collected before the rest of the crops take over the area.

Improved pollination

Pollinator diversity and abundance can be improved by using companion plants in the garden. In order to increase pollination rates, it is possible to pick plant pairings that encourage and sustain the particular species of bees known to pollinate the target crops.

Improved soil fertility or structure

Large-scale farms have used cover crops and green manures for many years in conjunction with vegetable and grain crops. When implemented appropriately, even on a small scale, these soil-building tactics can have a positive impact on the health of a home garden. Using particular plant partnerships, such as those geared for breaking up thick clay soils or enhancing the soil's condition through the availability of root exudates, can also improve soil structure. Companion planting can help enhance the fertility of the soil by transferring nitrogen from one plant to another.

A protective structure for other plants

Rather than having to construct additional structures or use staking, consider using climbers and other tall, robust plants in your garden as natural supports. Climbing crops like cucumbers, beans, and peas can be

supported by vertically tolerant plants like maize and sunflowers. The shade provided by tall crops can help protect plants that don't need as much intense sunlight.

Improves flavors

It's a good idea to add some basil to your vegetable garden. In addition to improving the flavor of lettuce and tomatoes, citronella also helps repel mosquitoes. Who doesn't want to be able to keep insects at bay? It is possible to increase the flavor of other plants with the help of friendly soil mates.

Improved aesthetics

While slope-covering ground coverings and other monocultures have their place in the garden, it's hard to find a garden guest who doesn't prefer a mixed planting to a monoculture. A mixed-planting style is ideal for a home garden, unlike a farm, where rows are required for mechanized harvesting. Companion planting's aesthetic benefits are augmented by the fact that tiered gardens with various plant forms and growth patterns, from floor covers to trees and anything in between, attract a wider range of insects and other creatures.

More variety

Many different varieties of peas can be grown at the same time in different parts of the garden. Peppers, tomatoes and nearly any other crop can be treated the same way.

Choose a Garden That Fits Your Lifestyle and Space

Choosing what to plant and where to grow it is the first step. To help you plan your garden, here is a list of some of the most famous gardening techniques.

Gardening Methods

You may garden in various ways, but which one is most suited to your needs and the size of your garden? These are some of the most commonly used methods:

In-Ground Garden Beds

An in-ground garden bed consists of a patch of land that has been excavated, and the soil has been loosened so that it may be planted. Direct seeding is the only way to cultivate plants.

Because it doesn't necessitate any additional construction materials, in-ground gardening is often less expensive than alternative approaches. If your current soil is adequate, you may not have to spend money on soil amendments such as loam or compost. If you don't have access to well-aged manure or high-quality compost, you can still add it to your garden bed.

Creating and maintaining an in-ground garden bed is time-consuming and labor-intensive, based on where you place it and how you build it.

Raised Rows

Conventional in-ground gardening and raised-bed gardening techniques are combined in this method. Raised beds have a superior soil structure than in-ground beds, but they require more time and effort to maintain, whereas this method avoids both the time and expense of constructing a raised bed.

Soil and other organic matter (mulch, compost, or straw) are placed in a raised row or hill to create an elevated soil area. When using the raised row method, you're creating an ever-degrading mound of nutritious soil that benefits the entire garden. In contrast, in a raised bed, the soil is never allowed to leave the confines of the bed.

An established garden bed, a lawn, or any other plot of ground can be used for this procedure. Even if you don't have the time or resources to build a raised bed, you can still cultivate your crops in rows.

Garden Beds Above-Ground: Straw Bales And Raised Beds

Straw Bales

Gardening in straw bales involves planting straight into a straw bale. The bale serves as both a home for the plants and a medium in which they can thrive. As the straw breaks down over time, the bale delivers nutrients for plants throughout the planting season because of its tight structure.

Berries, squashes, tomatoes, and other fruits and vegetables will grow in straw if they are properly prepared and cared for. Choose the permanent location of the bales with care, as wet bales are weighty and hard to move once they have been set.

Once the straw bales have been conditioned for 12 to 18 days, they are ready for planting. Decomposition can be accelerated by keeping the bale damp and fertilized.

Raised Beds

Since its inception, gardening on raised beds has grown in popularity, and for a good reason! You can think of raised garden beds as essentially huge, bottomless containers. In most cases, it is a custom-built structure of stone, wood, or concrete that is put in a sunny location and filled with high-quality soil.

The advantages of a raised-bed garden are numerous. Raised-bed gardening, for example.

- Small areas where plants need to be restricted
- It is suitable if ground soils are rough or of low quality
- Deep rooting and Improved drainage increase yield.
- Prevents the discharge of water
- Eliminates the need to bend or stretch to reach the ground
- Reduces strain on back and knees when doing ordinary

garden labor

- When used in conjunction with row coverings, it extends the growing season

If you want to learn more about raised bed gardening, I wrote a book on the topic with all you need to know to grow a productive and functional garden. You cn find the kindle format here **https://www.amazon.com/dp/B09Y2BMKKZ** and the paperback here **https://www.amazon.com/dp/B09XZ8J23Z**

Container Gardens

There's no excuse for not having a garden if you don't have enough room. Hanging baskets, grow bags, and other types of container gardening have become increasingly popular as the number of people who live in flats rises.

When it comes to growing circumstances, you have a lot of flexibility with containers because you can customize your care for the plant you're cultivating. You may, for example, shift containers to and from the sun, hydrate them as needed, and regulate the temperature of Insect pests, and soilborne diseases can both be avoided with the use of containers.

Tips for Container Gardening

Roots of healthy plants need a lot of room to grow, and a lot of space is needed for this. Because of this, larger containers are generally preferred. Here are a few more things to keep in mind:

- Aside from the fact that plastic pots don't dry out nearly as rapidly as unglazed terra-cotta, black pots also absorb heat from the sun, which can also cause the soil to dry out more quickly. Drying time for fabric grow bags will be quicker, allowing for better root-to-to-toe air exchange.

- A garden can thrive in any container that can retain soil. Use barrels, buckets, crates, grow bags, baskets, bath tubs, or troughs. Place your pots where you can easily care for them and where the plants will thrive, regardless of their size or type.
- Make sure that any container you use has drainage holes at the bottom. If you want your vegetables to grow well, they need at least six to eight hours of direct sunlight each day.
- It's a fantastic idea to hang baskets to maximize space. At eye level, you may effortlessly manage cherry tomatoes, harvest herbs, or strawberries. Tossing a fresh salad from the ingredients in a large window box is easy and convenient.
- Saucers can be placed under plants to catch rainfall and safeguard a deck or other floor. To prevent your plants from drowning, make sure to remove any standing water.
- Most veggies require a constant supply of water to thrive. Many plants need to be watered twice a day because of the drying effects of wind and heat. Using containers with a water reservoir at the bottom, which may be used to irrigate dry soil, is an option to consider.
- Soil from a yard or garden is excessively heavy, might get soggy, and brings illness and pests. Premade potting mixes, local compost, or a soilless mixture with organic content are better options.
- Crumpled newspaper or Sphagnum moss can be used as a filler in the area between two pots to help keep plants in containers cool and moist. Soak the filler material between the pots in the water you use to water the plant. The wet filler serves as an insulator because of its moisture content.

1.4 BENEFITS

Benefits Of Growing In The Ground:

- Getting started is a cinch: In just a few hours, you can get this type of garden ready for planting.
- Affordability: All you need is a spade and a tiller; no further materials are required.
- There are no size or shape limits: You are free to design the bed of your dreams, no matter how big or small it is. In our medicinal garden, we use triangle-shaped raised beds.
- You won't have to water your garden as much as you would if you utilized raised beds or pots since you'll have access to all the groundwater that flows through.
- Professional farmers cultivate their crops in the ground for a very good reason! Planting straight in the ground is the most efficient method of producing the greatest amount of food in the smallest amount of space.

Benefits Of Growing In Containers:

- Container gardening is a terrific alternative if you're a renter or live in an area where you can't put in a more stable garden.
- It is affordable. Just a few big containers and packets of organic potting soil are all you need to get started. A container vegetable garden can easily be started for less than $50.
- A tiny footprint: Whether you have a sunny patio or simply a little window sill, you can grow some food in a container there.

- Only a small investment of time: Gardening isn't your thing? An excellent method of "testing before you buy" is container shopping. Let us know how it goes if you and your family like cultivating in a few containers! However, you stand to lose very little if you don't like it.

Benefits Of Growing In Raised Beds:

- Deep rooting: The roots of plants are quite lengthy. They aspire to dig their fingers deep into rich, loamy soil. Roots have greater room to grow on a raised bed. If you build tall, raised beds, this is even more true!
- Everything is yours: Having complete control over my garden is one of the most appealing aspects of planting in raised beds. Even the pests and weeds are under my thumb since I have complete command over the soil and plants.
- By lifting the mattresses, you don't have to bend over as much, which saves your back. Weeding takes less time now that the conditions are under your control!
- In fact, you won't have to use heavy gear or till your beds again after they are filled with rich soil. Compost is a must for amending the soil in your beds, but other than that, you don't need any form of technology to do it.
- There is no mistake about it; a well-executed elevated bed is a magnificent sight.

1.5 PRINCIPLES OF COMPANION PLANTING

Cooperative gardening teaches us that an organic garden thrives and flourishes when nature is replicated and interactions are nurtured, not suppressed. The appearance of an organic garden that has been successfully established will differ from that of a conventional garden. Because pests and illnesses are kept at bay by applying chemicals, a chemically reliant garden can be cultivated in neat rows. It's easy to be fooled by the chemical garden's appearance of order and cleanliness.

Companion planting has five key rules:

Principle 1: **Rotation of the Agricultural Cropping System**

Soil-dwelling pests and diseases that have been waiting for an edible to return may be disoriented if you rotate your crops each year. In addition to fusarium and verticillium wilt, tomatoes are also prone to bacterial wilt. As long as they can discover your tomato plants in the soil, these diseases will feast on them each year. As a result of this, diseases and pests will die off as the tomatoes move from bed to bed, like transitory gypsies. Planting the same crop family in the same bed more than once in four years is a waste of space in your garden. If you have a tiny room, this can be incredibly tough. To ensure optimal crop rotation, any garden space, no matter how tiny, must be divided into four or six portions at least.

Additionally, crop rotation provides a steady supply of nutrients to each bed. The quality, size, and productivity of the harvest will decrease year after year if the same crops or crops from the same group are planted in the same bed. The soil is replenished by crops like peas and beans, whereas cabbage and corn "heavily feed" from plant beds. When crops are rotated annually, nutrients are rebuilt, and soil density is maintained at a reasonable level. Keeping that in mind, it's best to avoid planting heavy

feeders in the same spot over and over again. Radishes and spinach, for example, have shallow roots in comparison to other crops (around 12 inches). Compared to the roots of a squash plant, the latter can reach a depth of six feet or more. Digging deep taproots brings up nutrients that are buried in the soil. In comparison to "double-diggers," they'll be able to go far deeper and won't need a shovel. When it comes to cultivating the soil, your plants can do it all for you.All kinds of root depths are accessible through crop rotation, and the deeper taproots will remove impurities from the soil on an annual basis. To avoid competition for the same minerals, plants with varying root depths should be placed together to maximize the available space. Increased seeding density is possible if plant roots are not competing for water and nutrients.

Principle 2: **Interplant**

To be crystal clear, I'm not talking about a bed of cabbage with several marigolds at either end when I use the phrase "interplant." A typical bed of interplanted herbs, flowers, and vegetables has between five and seven plants that have been chosen for their different rooting depths, final heights, growth rates, and shadow tolerance in order to work together synergistically. Let's not get bogged down in the technicalities of "polyculture," which is the newer word for this style of gardening.

Nasturtium, zinnia, and calendula space concerns are common among beginning companion gardeners, who are afraid that the flowers take up valuable growing areas that could be used for food. Even though herbs and flowers take up some of the areas in an interplanted bed, I've discovered that, to my knowledge,

with companion planting, a larger yield is often possible. Species of pests are deterred by the scents of herbs and flowers, or they are consumed by helpful insects. So long as the edibles are left alone, they'll grow stronger and healthier.

Companion plants need not grow at the same rate, but they cannot eat each other. Crops that climb upright and tall can be planted in plants with a small terminal length and a long growth period, but not crops that spread outward. Because of its vine-like growth behavior, squash can take over a considerable area by the end of the season. Also, radishes are great in squash gardens. Rather than nasturtiums, you may plant radishes in your squash beds, and they will come ready for harvest before the squash does. Because of its tall shape, corn does well with squash and can last for most of the season before being overtaken by the vines. For the first time this year, I started the nasturtiums indoors to give them an early start on the season. Avoid falling into the same trap in your garden by checking the growth rate of any seed before planting it.

Nutrient Needs— To produce enormous fruits like eggplants, lettuce requires rich, well-drained soil. Peas and beans are high in nutrients. Soil developers and light feeders should alternate with heavy feeders to allow the soil to replenish its source of nutrients. Crimson clover can be planted in the fall to restore soil that has been occupied by heavy feeders for most of the growing season.

Available Sunlight— Sunlight can be blocked by fences, trees, shrubs, and even competing plants. Most vegetables like full sunlight, but some can withstand slight shadow. Planting some crops in the shadow of their sun-loving companions makes perfect sense. Keep records of the path of the sun throughout the day in your garden. Because our garden is south-facing, we plant our tallest crops in the back or at the end of each bed. When planning the garden, think about how tall each plant will be when it's done growing for the year. Jerusalem artichokes can grow up to ten feet in height, even though they start little. As a rule, trellised or tall plants should dominate the northern side of your edible gardens. The trellising of vine crops can help them grow more efficiently. It is natural for squash and cucumbers to grow toward the sunlight they need. There is room below for crops like cucumbers and spinach that require partial shade.

Location— Even if you want to produce a lot of peppers, you don't have to put them all in the same bed. Interplanting is possible if half of the peppers grow in one region of the garden and the other half in another. For its reputation as a deterrent, I spread garlic throughout my garden. The fruit trees, perennial beds, a single row of cloves, and a little plot at the front of one of my larger beds all have their unique arrangement of cloves. Combo planters dispute whether to cultivate crops of the same

variety together or spread them out across the garden. Because broccoli, collards, and kale are all members of the brassica family, it makes more sense to grow a bed of them together. Only that particular area of the garden will be affected, and it will die off the following year. Planting them together in the same bed, on the other hand, may entice pests to approach. In my experience, it relies on the type of plant being cultivated. To avoid diseases and pests, it is best to grow the crop in several smaller patches around the garden rather than a single large one. However, if a plant is resilient by nature, it can share a bed with other members of its family. Tomatoes are scattered across the beds of my garden, whereas cabbage, kale, and broccoli have been put together to form a family.

Try to think outside the box when it comes to the layout of your bed. Rows have a role in the garden, and also, some beds are better suited to crops that are planted in a grid-like pattern. Despite this, there is no necessity that each crop grows along the bed in a straight line. Allow the rows of crops to intertwine and blend. Four tomatoes in a continuous line, borage around the margins, peas on the tomato cages, and chives in a southern corner are typical early spring bed configurations.

Principle 3: **Increase the Number of Plants You're Growing**.

Pay close attention to the spacing of seeds and transplants before planting them in the ground. While the transplants are still little, mulch should be

placed in the soil in order to protect

them from the elements. A garden bed's "ground floor" is no longer visible when the crops have grown to their final size. Be prepared for the following crop if you know that one plant will be plucked before another in the same soil has even begun to yield. In the early spring, a single bed might be planted with spinach and lettuce; in the summer, peppers, eggplants, and bush beans; and in the autumn, carrots. This method is frequently referred to as "successive planting" by gardeners.

Principle 4: The Edible Garden should include flowers and herbs. Gardening with flowers and herbs can be a challenge in patience and faith. Flowers may appear to be an unnecessary extravagance, but in reality, they not only can enhance the aesthetics of your garden, but with the inclusion of flowers and herbs, a wider range of species can find their own optimal environment. Pest control in your garden will be easier if you have a large population of beneficial insects, which are attracted to biodiversity. Beetles, birds and bees all visit an organic, companion-planted garden, but they do so as friends, not foes.

Principle 5: Beyond the Garden's Border, a Companion Planting You should think of your garden's ecology as including everything from your trees and hedges to your perennial flower bed and the tiny creatures your garden provides shelter for.

Resident and migrating birds alike use the hedges and trees as a refuge. Toads can thrive in low-growing plants.

Healthy garden soil is the actual and symbolic foundation of every companion planted garden, so don't skimp on it while preparing your beds for companion planting. Sunlight, water and soil rich in microbial life is essential for the growth of companion plants.

1.6 ROLES OF COMPANION PLANTS

To get the most out of your garden's companion plants, you must first grasp their job. Four things happen in the garden when specific plants are present:

Nurturing

These are the plant world's nurses and doctors. Plants benefit from their ability to suck up nutrients from the soil. They also aid in the recovery of other plants and the development of resistance to pests and diseases.

Examples: Lovage, oregano, marjoram, sow thistle, valerian, stinging nettle, yarrow.

Sacrificial

As a decoy, this companion plant attracts pests to itself, thereby protecting its neighbors. To prevent the infection from spreading to the crops, they are protecting, these sacrificial companions must be placed at a distance from those plants. In

order to keep aphids distant from the vegetables, I like to put a row of yellow nasturtiums in the far corner of the garden.

Examples: Yellow flowering nasturtiums, horehound, older vegetables that are left to seed.

Camouflage

Insect pests can't smell the plant you're trying to protect with these companions. As a result, the insect is unable to find food in the vicinity of the aroma. Certain geraniums and tansy can conceal the smell of kiwi fruit and tomatoes; for example

Examples: Catnip, eau-de-cologne mint, chamomile, feverfew, lemon balm, geraniums, onions, pennyroyal, garlic, peppermint, spearmint, soapworts, tansy.

Stimulation

Companions who stimulate each other improve each other's flavors, nutritional value, essential oil content, and output. The benefits to the gardener can be seen and tasted when these friends are planted together. Incorporating borage into a strawberry or lettuce garden will result in an abundance of flavorful produce.

Examples: Santolina, Borage, coriander, chervil, elm tree, garlic, foxglove, horehound, morning glory, lovage, mulberry, rosemary, wallflower, peppermint, salad burnet, tansy, stinging nettle, valerian, yarrow.

Chapter 2: Get Your Garden Started

Once you know that some plants grow best when planted with others, help each other grow, resist pests and enhance flavor, you start to plan your garden accordingly. At the end of this book you will have four pages for you to design and plan the strategic layout of your garden. Planning the right location for each plant, is half the job for the conscious gardener.

Companion planting not only benefits your plants but also makes better use of your garden area, allowing you to gather more. Companion planting is also beneficial to pollinators, wildlife, and the health of the soil. This chapter has given you all the information you need to start your own companion planting garden. Here's how:

2.1 PLANNING YOUR GARDEN

Spend some time analyzing the area you have accessible to you before making an organized plan for the coming year. Go on a brisk walk across your yard twice a week for many weeks and write down everything you see.

What kinds of creatures are currently visiting your yard?

This is an important aspect as well. The presence of wildlife in the kitchen garden can be both useful and infuriating. Others can wreak havoc on your flowers and vegetables if they don't get eaten by other pests. Consider how these creatures may affect your landscape design. Always keep a keen eye out for various creatures that can wander into your yard. A strong fence is the best deterrent for larger intruders.

Where does the sun shine the most frequently?

Find a spot in your yard that gets at least 7 hours of unfiltered sunlight for your garden vegetables. There's no rule that says your garden must be square or rectangular. Any shape of the garden, no matter how irregular, is totally acceptable as long as it doesn't interfere with the plants that shade your yard. A more imaginative and eye-catching garden design may be encouraged by the limitations imposed by the amount of light accessible in your yard. If your entire backyard is covered by a tree, you may want to rethink your gardening plans. Take some time to examine the space in your yard after recognizing the arrangement of sunlight there. To get started designing your first garden beds, you'll need these measurements. Take note of your yard's slope and how rainwater drains off it. Assuming your land isn't flat, the only option is to build a wall to level it out. If the rain is too fierce, you may want to move your garden somewhere else.

What are the accessible water resources on your land?

What you can produce and how many you can grow will depend on the

weather in your part of the country and the availability of free water. Check to see if the location you choose for your garden is close to a water source in case you need to water in between rainstorms.

In what condition is your yard's land?

Land that has been neglected for some time may be in much better condition if you've recently purchased it or started gardening. To restore the soil's natural organic microbial activity, it will take several years of soil amendments.

Also, keep an eye out for any existing perennials in your garden. If you're not already familiar with perennials, try to identify them one by one. In any companion planting, perennials are a need. Some perennials may be considered invasive weeds by gardeners. However, even these "weeds" have some advantages. The borders of my yard are dotted with Goldenrod, Queen Anne's Lace, and joe-Pye weed. Perennials can be left in their current location, which is less work than removing them all at once.

2.2 LAYING THE GROUNDWORK

One of the most important aspects of a healthy partner-planted garden is the quality of your soil. Healthy, diversified soil is essential for all plants in your garden's ecosystem to thrive. Your plants will be better able to withstand the threats of the outside world, such as pests and diseases, if they are strong. The garden will have more beneficial insects because of them. Once you've chosen a location for your garden, you should check the

soil's texture and pH to make sure it's suitable. There are two simple tests you may perform to learn more about the composition and acidity of your soil.

Soil Composition

Clay, sand and silt are the three primary constituents of soil. Even though sand drains well, its nutritional content is extremely low, and plants can become thirsty if sand drains too quickly and does not retain moisture. The nutrients in clay soil are significantly more concentrated, and the moisture it retains is much better. Insufficient root area in clay soil can choke plants, and the soil itself is typically opposed to releasing any of its stored water to the crops. If this condition persists for more than a few days without water, clay soil will crack and break. One of the three components, silt, is the best. Silty soil is a mixture of clay and sand but without the extremities of either one. In the absence of heavy rains that compact the soil, silt can retain rainwater but drains quickly. Conducting a soil test can help you discover the soil types in your garden. Fill a mason jar with about a cup of filtered water and a cup of soil. This will serve as your growing medium. To ensure that the dirt and water are well mixed, shake the jar. Finally, leave the jar on your table overnight to let the soil settle.

You'll notice that your soil has broken down into three distinct layers once it's settled. Sand is found at the bottom of the soil. Silt covers the

intermediate layer, and clay lies on top with thin,

smooth particles. Your soil is of high quality if it has an even distribution of particles throughout each layer. The term "loam" refers to soil with the same proportions of all its constituent elements. Your soil has more of a particular component if one element is more than the others. When you begin planting, having this information can be really beneficial. Although you can't drastically alter the texture of the soil, you may make up for any inadequacies in the soil by adding nutrients to it. For sandy or clay-based soil, a season of compost, mulch, and cover crops should be used before to planting.

A Soil's pH—Alkaline or Acid

Preparing for planting requires checking your soil's pH. Soil pH can range from as low as 0 to 14. Neutral soil has a pH level of 7. Any figure lower than 7 indicates that your soil is acidic somehow. Soil with a pH value greater than 7 is considered more alkaline. It's best to cultivate veggies in soil that's somewhat acidic (about 6.5). Your area Cooperative Extension Service will do a free soil test for you. Garden nurseries often sell soil tests as well. It is possible to conduct a simple DIY soil test at home, but it will not provide you with an exact pH reading. Fill two mason jars with a cup of dirt each to conduct a soil test at home. Soak the dirt in each pot with a little water. A cup of vinegar and baking soda goes into the first jar. A fizzing or bubbling jar is possible. It is highly alkaline if the vinegar jar has bubbles in it. Soil that fizzes in a baking soda container is

acidic. The soil is more neutral if neither of the jars shows any reaction. Organic matter should be added to the soil if it has high levels of alkalinity or acidity before planting. You can consider dedicating a year to improving soil tilth if the soil has been ignored for several years. Not unless your soil is acidic or alkaline. The soil will gradually return to its original pH balance if organic material is added to it.

Life in the Soil

You must first know what fertile soil seems like on a biological level before you can begin feeding it. The soil is a hive of activity. There are microscopic and larger-than-microscopic animals in your soil, moving through the ground, constructing tiny paths and consuming and removing as they go. Microorganisms can breathe easier thanks to the channels that aerate the soil. To assist root growth, the aeration of soil also creates channels for rainwater to settle. Between rainfalls, the soil is kept moist by the rain that permeates the soil. Aeration can be felt by crumbling some of the soil into your hands. Having a good degree of "tilth" in your soil means that it will crumble easily. Roots can thrive in aerated soil that is free of obstructions. If the earth is compacted, rain cannot settle, roots cannot spread, and microbes cannot breathe as a result. Plant growth will be slowed, and a lack of oxygen creates an ideal environment for the growth of harmful microorganisms.

There are both macro and microbes living in the soil. Because macroorganisms can be seen with the naked eye, they are easy to identify. Keep an eye out for earthworms and spiders that will scurry out of the way every time you use your trowel in the dirt. Macroorganisms include organisms like burrowing insects, spiders, earthworms, and rodents like moles and voles that dig their tunnels below. Microorganisms such as this one break down new organic stuff into smaller pieces. Digestible materials are then eaten by microorganisms—bacteria, algae, fungus, and many other minute germs. Because of the microbes' process of eating, digesting, and excreting, soil nutrients like calcium, potassium, and phosphorus are transformed into forms that plants may easily absorb. It is the interplay between the creatures, the nutrients they produce, and the plants that take those nutrients that build the basis for a garden that is lively.

Improving Your Soil

To fully care for your garden's plants, you must also start taking care of the soil's needs. Consider your soil as a living thing that needs to be cared for. I like to see the earth's soil as one enormous kind, generous, and hungry

creature, despite the fact that it is actually made up of millions of micro and macroorganisms that are all interconnected and interdependent. As a result, I can now better grasp how to care for the soil.

First-year as a gardener, I followed this procedure. My arms and back ached from the labor, but the soil in my gardens appeared to be fluffy and well-aerated. The idea behind this procedure was that stirring the soil would release nutrients that had been compacted beneath the surface, making them more readily available to the plants. Digging would also improve root penetration by aerating the ground. Using a rototiller, the gardener is able to plow through the garden bed, turning the soil very effortlessly. It is possible to accomplish the same results with less effort with these two criteria. Healthy soil can be created without putting too much strain on your joints and back. The deep excavation also destroys the existing environment below the surface. An invasion of microorganisms, earthworms, and other organisms disturb the intricate network of tunnels that have been woven together. There will be no earthworms in your garden if you use rototillers. There will be a lot of nutrients on the surface, but most of them will evaporate before the plants can use them. The soil on the base will also be pushed deeper into the bed due to the digging operation. A lack of microbes in the top layer of soil means that the dead soil will now mix with the roots of the plants. If you dig down far enough, you can find weed seeds that have lain dormant for a long time, and they will happily grow once you do. Despite the soil's appearance, it has a weak structure and will contract as soon as it rains heavily for the first time. Exactly like the Dust Bowl era, this procedure produces identical conditions. Farmers developed enormous, nutrient-rich plants in the first years after they dug up the prairie soil. They were left with nothing but dust as a result of this depletion. Why gardeners have opted to reproduce this technique on a lesser scale is beyond me, but it's clear that it doesn't work. In the long run, substantial fertilization and more regular rototilling will be necessary for the gardener to maintain a reasonable yield level. The garden's soil organisms can produce healthy soil for you instead of using

such aggressive and time-consuming methods of upkeep. Add organic materials like compost and mulches to the soil, as well as cover crops or soil supplements to improve the structure of the soil. The food is eaten by nematodes, fungi, bacteria and insects, which decompose it into the soil. The soil isn't disturbed or killed by aggressive tilling or artificial fertilizers.

2.3 BUILDING HEALTHY SOIL NATURALLY

Compost, cover crops, mulch, and fertilizer all play a role in creating healthy soil.

Composting

There's no reason why you can't make room for a compost pile in your yard, no matter how limited your space may be. A companion-designed garden would be incomplete without a compost pile. Composted food is a renewable source of nutrients for future generations of plants since it mimics

nature's decomposition process and regenerates the waste of past seasons. Minerals are naturally present in the decaying plant materials that bacteria use to create them. Compared to clay or sand, it holds onto water better and requires less frequent watering.

Compost pile placement should be determined before you begin building it. It should be accessible from both the house and the backyard. Choosing a position in the shade is a good idea if you live in a hot area. If you reside in a colder area, choose a spot that receives plenty of direct sunshine.

Cold Compost vs. Hot Compost

In order to make your own compost, there is two primary methods: cold and hot compost. You don't need to plan ahead of time to build a cold compost pile. The pile can be filled with grass clippings, leaves, yard and garden detritus, and even culinary scraps without regard to the moisture levels, ratios, or heat of the material. Composting with a cold compost pile is the most straightforward option for individuals who are new to the process. It's a place where organic waste from the yard and kitchen can be thrown away without using a plastic bag or a rubbish container. Cold compost piles, on the other hand, have several drawbacks. With a decomposition rate this sluggish, you won't be able to get all of the

compost you need from cold compost in a year or so. Breaking down huge bits of

material, like branches or stems, might make the process take longer. Weed seeds and bugs cannot be killed in cold compost because it does not generate enough heat. Building a hot compost pile, on the other hand, isn't that much more difficult, and the rapid output rate of useful compost can be strangely satisfying for kitchen gardeners. To build a hot compost pile, you'll need to devote more time and attention to the decomposition process. Compost aerobic activity is accelerated when carbon (black materials) and nitrogen (from green materials) are kept in an equal ratio (brown materials). The moisture content of green garden materials is high, while that of brown compost materials is low. Build a three- to four-foot-high hot compost pile by layering green and brown materials. The thickness of each layer should be around 6 inches. Wet the pile as you add items if they are dry. For an extra burst of microbial activity, I like to mix in a shovel or two of completed compost between each layer. Too much sun on a compost pile might cause it to dry up in areas with drier weather.

Use a tarp to keep the moisture in and a hose to add more if necessary. After a while, the pile should be as moist as a damp sponge. Giving your pile a short stir with a pitchfork will reveal if it is heating up. Compost piles that are too hot can reach temperatures of up to 160 degrees Fahrenheit within, causing them to steam up. Composting does not necessitate turning the pile on a daily basis. It's better to keep nutrients inside the pile

rather than allowing them to be exposed to the outside world. When making hot compost, it's critical to keep the brown and green ingredients in the same proportions. The pile will get anaerobic and begin to smell if there are too many green items in it. Compost has gotten a bad rap because of how bad it smells when it's made up entirely of green waste. There will be no odor from a compost pile that is properly balanced. The materials will not decompose if there are several brown compost elements in a pile.

Mulching

Mulch is made from many of the same ingredients as compost. Mulch, despite its age, retains a lot of its original look and feel. It is possible to lessen the regularity of overhead watering by using mulch made from organic materials in your garden. In addition to fertilizing existing plants and improving soil aeration, organic mulch also serves as a habitat for beneficial insects and reduces weed seedling germination. Because the soil doesn't compact during rain, plants don't become caked in gross mud or sand. By softly tilling the soil in the fall, mulch's nutrients become part of the garden. They will happily eat their fresh food supply of soil organisms. I find that mulching my garden beds makes my plants more content, as well as makes the landscape appear more organized and clean-cut. With eye-catching mulch-like shredded leaves, the focus shifts away from the soil and toward the plants themselves. Mulches made from

organic stuff are my first choice for a companion garden. As they're all free and will eventually decompose, pine needles, grass clippings, chopped leaves, and newspaper are one of my favorite materials for crafting. Fall is a great time to clean up your yard and find bags of leaves and grass trimmings along the roadside if you have a small yard.

Mulch-making debris is normally allowed to sit in a mound for a few weeks before being used. Plastic was formerly one of my garden's mulches, but I've since stopped using it. Weeds will be killed by the warmth provided by the black plastic. It will decline in quality and become plagued with tears or rips if it is exposed to the sun. It will take a thousand years for the now-useless plastic to decompose, and it delivers no nutrition. At times, I unearth plastic set down by past occupants of my garden, which is considerably older than me. Wait until the soil has warmed in the spring, but before the summer weeds have sprouted, incorporate mulch into your garden. There should be no spring rain or melted snow in the soil. Remove any weeds that have survived the winter and add an inch or two to the height of the bed with a shovel. If weed

development is a concern, spread newspaper on the bottom of the bed. When seedlings are transplanted outside, mulch can also be used. Mulch should be kept at least an inch away from seedlings to prevent rot. If you live in a hotter area, you may want to mulch your lawn more frequently because the heat will accelerate the

decomposition of the mulch. Cool-season crops, such as cabbage and broccoli, can be kept colder by adding mulch to the soil. Mulch shouldn't be applied to warm-weather crops like eggplants and peppers until the soil has warmed up enough to do so.

Mulch Varieties

Grass Clippings

As a fine mulch, grass clippings protect plants that are vulnerable to weed competition, such as garlic and onions. They contain a lot of nitrogen; thus, they can help improve the soil in locations where it is lacking. Also, despite the time and effort, it takes to scatter them in the garden, they will last all season. As a gardener, you should only utilize chemical-free grass clippings. Make sure to exclude any grass that has started to seed. You'll have to deal with a new crop of weeds in no time if the seeds germinate. Grass clippings should be kept in a small pile until they have turned brown before being distributed in the garden.

Comfrey

Even though the comfrey plant appears to be out of place in the mulch, I assure you that I put it there for a good cause. Bell-shaped comfrey flowers are found on a big leafy plant. Potassium, nitrogen, and phosphorus are supplied to the comfrey plant's leaves by its roots, penetrating deep into the earth. Comfrey is a fast-growing plant after the first year of

establishment. Throughout the season, I remove the leaves from the plants and place them near the base. Flowering and fruiting plants are best paired with comfrey. When root crops are mulched, it has been demonstrated that they will flower before their tubers have grown to a significant size.

Originally from the British Isles, comfrey is a perennial herb that grows well in zones 3-9. If you're worried about comfrey taking over your garden, there's a sterile type called "Blocking 14" that won't spread.

Bark, Wood Chips, and Sawdust

Wood chips can be used as mulch surrounding bushes and trees in the garden or as a walkway. If you plan to use wood chips in your garden beds, it's a good idea to let them mature for a few months before doing so. Free wood chips were available to me from a nearby sawmill. If you happen to see a municipal tree removal service passing by, don't be afraid to ask if they have any wood chips they can spare. For free, they'll throw a load of wood chips on your lawn because they have to pay to remove them. Wood chips that have been colored commercially should be avoided. In an organic garden, the color is a chemical and should not be used. Bark chips can be used as an attractive aesthetic mulch for shrubs and perennials, but they should not be used in vegetable garden beds. Due to their durability, bark chips are frequently used in landscaping. To make matters even worse, they do not contribute any nutrients to the soil. It is

possible to use sawdust as mulch in edible fields, but it must first be aged. Young plants may be damaged by the high carbon content of fresh sawdust. Wood chips and sawdust can often be found from your local sawmill for free.

Chopped, Whole, or Rotted Leaves

Perennials that are sensitive to cold are best protected from the elements with a winter mulch of wood leaves. They can also be used after the planting season to protect crops from frost. A midseason mulch of chopped leaves is preferable. When slashed, the leaves are less vulnerable to the wind and can be used to limit weed germination around new plants. It's possible to incorporate the leaves into the soil at this point in the year. They will decompose and add new organic matter to the soil during the winter months. Leaves chopped and piled together will decompose,

producing a wonderful soil additive known as leaf mold. Leaf mold has a remarkable ability to retain water; therefore, it helps to keep the soil moist. If you chop up some leaves, you'll have to wait a long time for them to turn into leaf mold. Chop the leaves and place them in an isolated spot on your lawn to begin the process of creating leaf mold. Toss a pitchfork about in a pile from time to time. It is time to utilize the leaf mold if the leaves look soft and fluffy.

Aged Manure

In theory, you can use manure from any vegan animal to enrich your garden. First, check the source of the manure before using

it for composting. The hay that some animals eat comes from fields where broad-based herbicides were used in the spraying process. These herbicides will survive in the animals' digestive systems and damage your crop. Animals that have been given antibiotics or deworming medicines produce other manures. If horse dung is not composted properly, it may contain hay seeds. If you can get your hands on fresh manure that isn't contaminated, you should use as much of it for your compost. Manure must be aged before it may be spread on garden beds. Plants can be burned by the excess nitrogen in fresh manure. Either apply the manure in the fall and let it age through the winter or mature in the compost heap for at least six months before using it.

Hay or Straw

The distinction between hay and straw can be confusing to those who are new to gardening. Hay is primarily used as a source of protein for livestock. In a garden, it will produce a new crop of weeds because it includes seeds from whatever plant it originated from (such as clover, alfalfa, wheat, etc.). As a byproduct of the hay industry, straw is mostly made up of cereal crop stalks that have been hollowed out. Because it doesn't contain any weed seeds, it's suitable to use in a garden. Straw

should only be used in garden beds where weeds are low. Weed seeds can sprout in the soil because straw lets some light in.

With newspaper and straw, you can experiment with a second layer of mulch. In the winter, some gardeners use a straw to cover their beds as an extra layer of security, but this also serves as a cozy home for voles and mice. The grasses that thrive in salt marshes are the source of salt hay. Even though it has seeds, they will not germinate unless the salt marsh soil is present. Garden walkways are often decorated with salt hay (or cord grass). If you can't discover an inexpensive supply, hunt for cheaper alternatives.

Cardboard or Newspaper

Sheet mulch's bottom layer is typically made up of newspaper or cardboard. An impenetrable barrier is created by the material's dense composition, which blocks out light. The weeds will decompose, and new weeds will not grow. In terms of their weed-control abilities, both mulches should be considered equal. Organic nutrients are few in either. Remove any plastic tags from cardboard boxes by selecting newspaper sheets with only black writing. When laying newspaper, 10 to 12 sheets should be added at a time to make a thick enough layer. Add newspaper to the lawn on a quiet, windless day to keep it in place. Add extra layers of chopped leaves, grass clippings, or compost to the sheets once set down. During the winter, allow the leaves to decompose so that the ground can be prepared for planting in the coming spring. There is no need to remove the cardboard or newspaper covering from the garden bed if it

hasn't decomposed by planting time. Place your plants in the holes you've made in the newspaper or cardboard and secure them in place with duct tape or other adhesive.

Pine Needles/Pine Straw

Using pine needles as a mulch in perpetual beds and as a covering in

transitional beds is a great option. They can also be used as a fine mulch surrounding perennial crops like asparagus or strawberries. Although pine needles have a pH of 6.0 to 6.5, they won't have a significant impact on the acidity of your garden's soil.

Chapter 3: Plants Partnerships

In a natural setting, plants with similar or complementary needs tend to grow together nearby. Understanding how plants work best together is critical when working in a lab setting. Make things easier on yourself by going over my list of most commonly requested crops, along with the best companion plants for each one.

3.1 BEANS, CORN, AND SQUASH (THE THREE SISTERS)

Native Americans believed that these 3 crops could not live on their own. Corn, beans, and squash not only make fantastic garden companions, but they also complement one another in terms of nutrients. Bean vines will grow up on the high corn stalks if planted next to them.

Insects that feast on the corn plant's enemies are attracted to beans. Keeping pests at bay and providing a structure for the frail bean plants, the corn sustains and offers a framework for the fragile bean vines.

By virtue of this support, the corn is less likely to topple over in high winds because of the bean vines. For the next growth cycle, beans naturally create and provide enough nutrients to the soil.

Shade provided by maize and bean vines helps squash thrive. Shallow roots of the squash plant cover the soil's top layer, while the plant's spiky leaves deter pests.

3.2 COMPANION HERBS

Basil

Basil is a fantastic companion plant for tomatoes since it keeps the white flies away, and it also tastes great when cooked with them. For this method to work, you'll need 3 basil plants for each tomato plant. Having a pot or basket of basil in the kitchen and near the barbecue is a great way to keep flies and mosquitoes at bay. Basil has a phobia of being planted near the ruthless Rue plant. For the good of the garden as a whole, basil attracts bees.

Anise

The seeds of Anise and Coriander should be planted at the same time. There is a greater likelihood that they will both sprout sooner. While some argue that pairing coriander and anise is good for both plants, others argue that the two should be separated until the seedlings have matured a little. I usually wait until the saplings have grown a bit and show a clear structure, I then remove them from the soil, reposition them close to each other, and water them thoroughly.

Caraway

Caraway grows well in conjunction with the majority of vegetables. It does not thrive close to sweet fennel, but it pairs very well with peas. Caraway flowers attract various useful insects, particularly predatory wasps that prey on tomato hornworms. Place them next to your tomatoes to protect your tasty fresh salsa primary source. Because of its extensive roots, caraway can be sown near shallow-rooted plants in heavy soils.

Chervil

Chervil is quite similar to parsley and it’s my favorite when its used to give a delicate flavor, between basil and anise. It pairs well with lettuce, brassicas, and radishes, and thrives in partial shade. I like to plant some among rows of kale and tall cabbages, because chervil is a very effective slugs repeller. I’ve found that especially radishes and carrots benefit when planted near some chervil better as they taste better when grown near it.

Borage

Borage is supposed to prevent cabbage and tomato worms by attracting helpful insects such as small wasps and bees. It is also well known, they are excellent plant pollinators, but they also serve as a natural repellent for garden pests. Additionally, borage pairs well with various herbs and flowers in the garden. Other plants that grow well near borage are cabbage,

tomatoes, strawberries and squash.

Coriander

Coriander thrives close to other herbs that require similar amounts of water and direct sunlight, such as parsley, basil, and chervil. You may even combine these plants in a single herb garden container for simple watering. Aphids are deterred by coriander, which is a natural insecticide. When planted near Fennel, it interferes with seed production.

Chamomile

Boosts the aroma and flavor of other plants by encouraging them to produce more essential oils. When cooking with onions

and cabbages, avoid using too much Chamomile at the same time. Some plant diseases, including damping-off, can be treated using chamomile tea brewed by immersing the flowers in ice water for a day or 2 and straining. It is also a good source of calcium, which helps maintain compost piles pleasant and healthy.

Hyssop

Both grapes and cabbages can grow well on this soil. It's an effective way to keep the white butterfly at bay. Insects can be kept at bay by planting this plant in the garden. Radishes should not be eaten at any cost.

Chives

Planting carrots near chives increases their size and quality. Preventing parsley from going to seed is aided by chives. Chives can help prevent apple scabs if they are planted underneath apple trees. Black spots and Aphids on roses are claimed to be controlled by them. Powdery and downy mildew can be combatted using cooled chive tea, which is created by steeping chopped herbs in hot water.

Sage

Sage is an excellent companion plant because it gives numerous

advantages and deters pests. Sage attracts pollinators when allowed to blossom. Due to sage's capacity to expand into a bush, it's ideal for use as a boundary for vegetable beds.

Plant sage near other members of the cabbage family, such as cauliflower, broccoli, kale, brussels sprouts, and kohlrabi. Sage effectively repels cabbage worms, cabbage loopers, cabbage moths, cabbage maggots, and black flea beetles, which all attack brassicas. Sage is effective at repelling carrot rust flies.

Oregano

Oregano's antibacterial and antifungal characteristics make it an excellent companion plant for strawberries, cabbage, beans, cauliflower, sprouts, capsicum, and most importantly, tomatoes. Sage, like oregano, thrives in the same growing environment. Oregano thrives when planted in the same dry, sandy soil as sage. Both plants require only light watering when the soil dries.

Dill

Cabbage thrives in the presence of Dill. Lettuce and cucumber are also in this category. Carrots are said to be the nemesis of dill. A carrot harvest will be suppressed if the Dill is able to flower. Carrots and Dill get along very well if the latter is not encouraged to blossom. Dill and Fennel may cross-fertilize if they are planted too close together.

Thyme

The finest companion plants for thyme are frequently those that grow in similar environments and, of course, those that benefit one another. Thyme prefers rather dry soil and is drought-tolerant; therefore, avoid growing it beside plants that prefer moister or damper soil.

3.3 COMPANION VEGETABLES

Cucumber

When it comes to vegetables, cucumbers aren't afraid to mix it up with various other foods. Celery, dill, corn, and sunflowers also work well with them. Pair them with nasturtiums and marigolds to keep insects away. Refrain planting them next to potatoes, melons, or any odoriferous plant.

Peppers

Tomatoes, eggplants, and onions are all good companions for peppers. Carrots, cucumbers, squash, and radishes are also great complements. You can keep pests at bay by using a variety of herbs, including basil, parsley, oregano, and rosemary, in your pepper garden. Peppers should not be planted near broccoli, beans, or kale.

Carrots

Beans, lettuce, onions, and peas do well when planted alongside carrots. Leeks and radishes also get along nicely with them. Carrot pests are deterred by the use of rosemary and sage. Fennel, dill and parsnips should not be planted near one other.

Beans

Beans can be grown with various other plants since they are excellent nitrogen fixers. Potatoes, eggplant, radish, and cucumber are all good companions for them. Strawberries, radish, celery, beets, and peas are all good companions. Catnips and Marigolds are also effective in repelling pests. Make sure they aren't planted next to peppers, onions, or garlic!

Potatoes

Potatoes grow near cabbage and beans. Scallions, radishes, lettuce, and spinach also go well with them. When planting potatoes, surround them with horseradish and petunias to keep

pests and illnesses at bay. Cucumbers should not be planted near sunflowers, asparagus, raspberries, cucumbers, fennel, carrots, or turnips.

Beets

If you grow beets among radishes, beans, onions, lettuce, and cabbages, you'll see a big increase in yields. Non-beneficial insects are well-repelled by catnip. Beets' natural enemies, on the other hand, are field mustard, pole beans, and wild mustard.

Tomatoes

Tomatoes go well with various vegetables, including garlic, cucumber, carrots, and onion. A wide variety of aromatic herbs is also suggested. Additionally, they enhance the flavor of the tomatoes while keeping pests at bay. In the case of parsley, amaranth, basil, chives, and lemon balm, this is the situation. Co-conspirators that aren't good for you include dandelion greens, peppers, dill, eggplant, cabbage, and potatoes.

Radishes

With lettuce, cucumbers, peas, and beans, the radish is at home. Spinach, squash, and parsnips are also wonderful friends. Mix it with nasturtiums to deter pests. Kohlrabi should not be planted near it.

Eggplants

Even though growing eggplant is a labor-intensive task, it can be made easier with the help of a few kind neighbors. For better soil fertility, combine eggplant with beans and peas. As well as vegetables such as potatoes, tomatoes, peppers, and spinach, make excellent accompaniments. Pests are scared off by French tarragon and thyme. Fennel should not be planted near eggplants.

Kale

Onions, spinach, cucumbers, beets, celery, and potatoes all go well with this healthy leafy green. Most fragrant plants go well with it. To maximize

flavor, I recommend growing it with other aromatic herbs such as dill, rosemary and thyme. Bean, strawberry, and tomato plants should not be planted near this one.

Onions

A broad variety of plants may coexist alongside onions, making them easy to grow. They go best with a variety of vegetables, although cabbage, broccoli, and lettuce, carrots, and kale are all good choices. Pests will be scared away by the strong scents of parsley, dill, and mint. If you want to grow onions, don't plant them near peas and beans.

3.4 COMPANION FRUITS

3.5 WEEDS

When used correctly, weeds can be a valuable addition to our gardens. It's important to remember that they should never be permitted to outnumber the food plants, but you never know what impact a few stragglers can have. Roots of weeds break up the subsoil, making it simpler for crops' roots to penetrate further into the soil in a quest for water and nutrients. To prevent seedling veggies from drying out due to the heat of the sun, a few weeds can be useful for sheltering the ground. In the

meantime, capillary action will transport hydration from the subsoil to the level where new veggies may use it. The stalks and leaves of deep divers like pigweed, lamb's-quarters, and thistles pull up nutrients from the bottom earth. To get the minerals, these weeds have to be buried under the soil. As a result, the soil retains minerals, particularly trace minerals that would otherwise be lost in successive crops. Another fascinating feature about weeds is that they tend to store up any nutrients that are lacking in a particular soil. Alkalinizing minerals like calcium and magnesium can be

found in weeds like plantain and sheep sorrel, which grow in acidic soil. To grow well, bracken needs low phosphorus levels, and it contains many minerals. By removing the weeds, these minerals will be returned to the soil, where they can be used by food plants.

Additionally, weeds aid in the conditioning of the soil. Fibrous organic debris that decomposes and enriches the soil is left behind by their large root systems. Additionally, they leave drainage and aeration channels behind. When dandelion roots decay, they create passageways for earthworms, which excrete their waste into the soil. The soil's texture has been much enhanced, which will lead to a significant increase in the number of bacteria that live there. Weeds are good indicators of the sort of soil they prefer to grow in, so learning to understand them may be very helpful. In addition to docks, finger leaf weeds, lady's thumb, and sorrel thrive in acidic soil and are

good indicators of its growing acidity levels. Like hawkweed and knapweed, horsetail implies slightly acidic soil. A crust and hardpan are indicated by the presence of crust-forming weeds such as pennycress and morning glory, as well as other species such as horse nettle and field mustard. If you're cultivating land, you're likely to find chickweed (buttercup), buttercup (dandelion), lamb's quarters (plantain), nettle (prickly lettuce), field speedwell (common horehound), celandine (mallows), and carpetweed. Arrow-leaved wild lettuce and yellow toadflax, as well as onions, partridge peas and broom bushes, prefer sandy soils. When it comes to plants that thrive in alkaline soil, we're more likely to see species like woody aster, whereas limestone is more likely to support the growth of plants like Barnaby's thistle and field madder. Other alkaline-based plants include sagebrush and wormseed. If a plot of land produces healthy weeds, it's likely to produce healthy vegetables. Before they may set seed, let the weeds develop fully. Bury them under for organic manures after a few days of wilting. Compost piles can benefit from additional weeds, such as those pulled out by the highway department from public streets. Netting sweet clover and yarrows are just a

few of the herbs that are commonly included. Before planting them in the garden, these should be completely composted to remove their seeds. Weeds aren't necessarily bad for us, but it's important to remember that. They have the potential to become more than just coworkers with the right leadership.

3.6 WEED MANAGEMENT

Living Mulches

A short plant is used as a living mulch beneath a taller crop. Living mulch can be thought of as a conventional cover crop, but it's interplanted with a continuously producing vegetable crop in this case.

White Dutch clover, for example, is an example of a living mulch that simultaneously serves as a source of nitrogen.

More pollinators will visit your garden if it has blooming live mulches. Those blooms also provide nectar-rich in carbohydrates for helpful insects that prey on pests.

A living mulch's roots enter the soil and nourish your food crops with root exudates. Growing live mulch has the added benefit of out-competing weeds, but keep in mind that your vegetable crop may face resource rivalry with your living mulch. Weeds can grow in cover crops or living mulch that isn't properly cared for. There's a fine line to walk when using a cover crop in your home vegetable garden.

Wild Morning Glory

Wild morning glory is said to be beneficial to maize by Native Americans, but if left to go to seed, it can become a huge problem that returns for years. Spraying white vinegar on the core of each vine will kill it.

Wild Carrot

The deep taproot of a wild carrot does not necessarily imply poor soil; rather, it suggests soil capable of better cultivation. A dense stand of trees suggests that the soil could use some work before it would be suitable for growing crops. However, it can become a pest; therefore, cut the plant near

the ground after pollination to prevent seeding. Keep in mind that if you cut too early, you'll end up with many seedlings sprouting from the root.

Wild Radish

Wild radish spreads rapidly in soils deprived of nitrogen due to too many grain crops. Even in dry years, where manure is sparse and potassium fertilizer is abundant, it thrives. However, livestock loves it, and the seed yields fine honey and excellent oil.

Yarrow

The mysterious yarrow is a plant with a long history and a mysterious origin. When reviewing the I Ching, the Chinese mystic has traditionally used yarrow stalks as a divination tool. Neighboring plants benefit from the presence of yarrow, not so much in terms of size but in terms of their ability to withstand harsh conditions, improving their overall health. It enhances the essential oils and vitality of therapeutic herbs, making it an excellent companion. Cuts are believed to heal faster with this remedy. Because of its caustic, brutally aromatic scent, yarrow also provides pest resistance to neighboring plants. It can thrive in practically any environment, and it doesn't mind being trampled on. When it's mowed down by a lawnmower, it just spreads out and grows slowly.

Wild Parsnip

Wild parsnip is a nutrient-dense food crop that thrives on poor soils, yet it quickly spreads like a weed and is extremely difficult to eradicate. Heracleum lanatum (cow parsnip) is toxic.

Wild Strawberry

Despite their diminutive size, wild strawberries offer a flavor that's unlike anything else on the market. As acidity levels rise, their existence on pastureland serves as an indicator.

3.7 SUPPORT AND STRUCTURAL BUDDIES

To cultivate vine crops like pole beans and cucumbers, you must have a large garden or provide them with a secure base and urge them to grow upwards rather than outwards. Aside from Tudor style pergolas, trellises, and arbors, there is another alternative for gardeners who want to maximize their production space: live trellis.

When you think about it, a living trellis is exactly what it sounds like: a companion planting approach, with one plant proving better for another. In contrast, they probably don't improve the soil, prevent pests, or prevent disease in any way.

A living trellis is created by planting two different plants together, each with a different growth pattern. An upright, strong-growing crop is chosen, whereas a vining crop is chosen for similar characteristics. A live trellis can be created by putting the two together.

A woody plant, such as a tree or shrub, may easily be used to sustain a vine crop instead of a living trellis. The tree or shrub, on the other hand, may suffer from increased competition, reduced photosynthesis, broken branches, and the like. Whether a woody plant combination succeeds or fails is largely determined by the trellis plant's ability to withstand the stress of being "invaded" by another species.

Annuals, on the other hand, form only transitory alliances with one another. And if they are planted at the right time, the trellis plant will always be ahead of the vine crop. Matching a fast-growing, strong support plant with vine produce that readily attaches to it without becoming too weighty for its partner is the key. A little training is required in some circumstances, but in most cases, the vine crops will find their way up their companion plants on their own without any assistance from the

gardener. There should be something edible and pollinator-friendly in both plants so that you can reap the benefits of their cooperation.

Crops with smaller fruits have been the most successful for me for my climbing partner. Squash, watermelons, and pumpkins of the full-size kind may be too hefty for most people. Plants with high yields of small-sized vegetables that don't overwhelm their neighbors are ideal for vine crops.

There are some edible support plants, but not all of them. If you don't want to eat the plants, you can still admire their beautiful blossoms or foliage. For one thing, these plants may be swapped out easily, unlike other Plant Partners pairings based on more than just the plants' looks and physical compatibility. Experiment freely, but remember to account for the size and development characteristics of the individual plants.

Chapter 4: Pest Management

Managing the pests in your garden is the most important thing. Here are some ways through which you can manage the pests:

4.1 PESTS

Potato and Bean Combination

Planting bush beans with potatoes helps to keep the Colorado potato bug at bay. The Mexican bean bug is protected from the bush beans by the potatoes. Potatoes and beans should be planted in alternating rows.

Bacillus thuringiensis (BT)

The larvae of moths and caterpillars are particularly vulnerable to this bacterial disease. Toxic crystals are formed during the manufacture of Bacillus thuringiensis during the process of producing its spores. This material is safe for plants, humans, and other wildlife and can be used right up until harvest. In addition to controlling leaf rollers and tent caterpillars, BT also protects fruit trees from a disease that attacks the insect as a caterpillar. Commercial crops such as lettuce, celery, cabbage, cauliflower, broccoli, mustard, collard greens, kale, and turnip greens are protected by the disease. The bollworm and the tobacco budworm can also be treated with it. Pests such as Colorado potato beetles and mosquito larvae can be killed by special BT strains. Garden centers and mail-order catalogs sell BT products under various brand names.

Blackfly (Aphididae)

Fruits	Good Companions
Strawberries	lettuce, passion fruits, Bush beans, onions, and spinach
Peach	Basil, southernwood, tansy
Tomatoes	broccoli, peppers, Cabbage, roses, asparagus
Sweetcorn	pumpkins, Squash, pole beans
Squash	Corn, okra, beans
Raspberries	Tansy
Pineapples	Clover, southernwood, garlic, chives, daffodils

Citrus Fruits	Yarrow, fennel, dill and lemon balm
Melon	chamomile, sow thistle, Pigweed, summer savory
Kiwi Fruit	Carrots, carrots, swiss chard, spinach
Grapes	geraniums, clover, Chives, mustards, peas, oregano and blackberries.
Figs	Lemon balm, marigold, borage, dandelions, mustards
Cucumber	Peas and Beans
Cape Gooseberries	Pine, Yarrow and oak trees
Blackberries	Strawberries, yarrow, oak trees, pine trees, and dewberries
ubergines	Potatoes and tomatoes
Apricot	Chives, nasturtium, leeks, garlic, and daffodils

A fermented nettle extract can be used to keep this pest at bay, as wide beans are particularly vulnerable to it. Help is on the way from the lady beetle. Garlic, spearmint, nasturtiums, and southernwood can also be grown alongside beans in the same rows as garlic.

Fumigation

Smoke from oak leaves has proven useful for greenhouse gardeners who have problems managing ants, aphids, and termites, as well as that perennial pest, whitefly. It's safe to eat the leaves because they don't kill soil microbes or leave a toxic residue. Keep the greenhouse door completely closed while smoking the leaves for around 30 minutes.

Castor Bean

Castor beans have been shown in experiments to keep moles and insects away from gardens. In some locations, this is a common agricultural crop because of the oil content of the seeds; however, the entire plant, including the seeds, is deadly to cattle and people. A child's consumption of 2 or 3 seeds can be lethal, while an adult consuming six seeds can be fatal. When handling castor pomace, some people experience severe allergic responses.

If the seed heads are cut off or destroyed before they mature, this threat will be eradicated.

Plant castor beans around the garden's perimeter at intervals of five to six feet to serve as an efficient mole repellent. As a companion crop, you can also grow them. Plant a few pole beans near the base of the taller plants and allow them to climb. Large leaves and gorgeous variegated seeds of diverse hues characterize zansibarensis, the largest castor bean variety.

Flea Beetle

Flea beetles and other flying insects are known to hate wet conditions. Watering the plants in direct sunshine has been shown to deter them in many cases. A nuisance, although not extremely harmful to plants such as eggplants and tomatoes. Strong plants quickly recover from the injury, making the plant less desirable to the beetles as the leaves grow larger and tougher. In addition to discouraging the beetles, adding nutrients to the soil also benefits plants. If you want to keep beetles at bay, lay a layer of bruised leaves over the lines of plants to keep them from flying away. Interplanting lettuce with radish or kohlrabi can deter beetles.

Birds

Insect pests can be effectively controlled by attracting birds to the garden. The purple martins, which need to catch flying

insects constantly to survive, are particularly useful. Colonies of martins might be attracted to well-built martin houses that are placed away from huge trees. Feeders and waterers for birds will help attract other birds to your garden and urge them to nest there. These include hackberry, chokecherry and elderberry, as well as Tartarian honeysuckle and mulberries, as well as Japanese barberries, dogwoods, and red and black

raspberries. Nest-building birds prefer evergreen and thorny trees and shrubs. In the Southwest, many types of cactus are particularly suitable for this function.

There are instances, though, when birds become too much of a positive thing and devastate the food plants that we cultivate for our own benefit. We can learn this trick from the Chinese: when the fruit starts to mature, hang cut onions in the trees to deter birds from eating it. Many birds will be deterred by suspending empty milk cartons from a thread and allowing them to whirl in the breeze. Using vibrant, fluttering ribbons or pieces of cloth may also be an option. A watermelon or corn patch plagued by crows can be kept in check by erecting stakes and crisscrossing white thread around the patch. This will appear like a trap to the birds, so they'll avoid it. In order to keep cutworms away from young plants, a 3-inch cardboard collar should be placed around the plants, one inch below the surface and two inches above. Remove the top and bottom of a quart-size milk carton, and then use scissors to cut the remaining cardboard into three collars. An old matchstick, toothpick, twig, or nail pressed against the stem of the plant will deter the cutworm from encircling the plant and severing its vascular system. Cutworms will be repelled by oak leaf mulch as well.

Gopher

Plantings of scilla bulbs may deter these burrowing rats. This group of flowering plants, which are also known as squill or

scilla, has grasslike leaves and flower heads at the summit of long stems. Their early spring blooms make them a no-brainer for home gardens. Veggies and flowers can coexist in the same garden. However, you must use caution, as the bulbs must never be consumed.

Ichneumonid Wasp

There are at least 27 damaging kinds of moths and butterflies that this wasp parasitizes. However, this wasp prefers to lay her eggs in the tobacco

budworm and the bollworm, so if you want use her help, plant accordingly.

Borers

Fruit trees can be protected from borers by garlic, nasturtiums, and other alliums like chives and onions.

Grasshopper

Controlling grasshoppers can be challenging, especially if they are coming from nearby fields. This spray, however, will help: A mild green pepper, a small onion, and 2 to 4 hot peppers should be ground together and added to one quart of water to make a spicy soup. Strain after 24 hours of standing. Aphids are also deterred by this concoction. In times of grasshopper invasion, after-harvest plowing discourages egg-laying, whereas spring tilling before sowing prevents grasshoppers from developing from the eggs still there. Sabadilla dust and chinaberry extracts or extract have been efficient in the fight against these and other insects. This bait can attract grasshoppers: The region with the worst infestation should have multiple two-quart mason jars filled with a ten percent molasses solution. Orchards benefit greatly from the presence of chickens, which not only eat insects but also fertilize the soil with their excrement. Every few days, the coop can be transferred to a different site. Birds and cats devour a lot of grasshoppers that have been drawn to the garden by the presence of wild birds. I believe this is partly due to the thrill of the hunt for both of them. Except for horehound, grasshoppers won't consume anything but grasshopper-resistant corn and wheat.

Eelworm

Small, blind, eel-shaped animals known as nematodes feed on or lay their eggs within the roots of plants, producing knots while they do so.

Beneficial fungus and nematodes that prey on plant-parasitic eelworms thrive when organic matter is added to the soil. In decaying vegetation, these fungus thrive and kill worms. To decrease wireworm and nematode invasion, a thick layer of barnyard manure can be applied to the field before plowing. Insecticide-resistant marigolds and dahlias (Dahlia Sativa) can be used to keep these pests at bay. Asparagus is a natural nematocide. Consequently, tomatoes near asparagus are protected from the asparagus beetle, while the tomatoes protect asparagus from the insect.

Cockroach

Cockroaches and termites benefit from the application of chinaberry extracts. Additionally, Haplophyton cimicidum, the little-known cockroach plant from Mexico, is a helpful tool in the fight against this pest.

Diatomaceous Earth

Small, fossilized, one-celled animals called diatoms, which lived in the oceans and built tiny shells around them out of the silica they absorbed from the water, are the source of this highly potent insecticide. Ancient seas left behind minute shells that accumulated to depths of up to several thousand feet. Insects' bodies are punctured by silica microneedles, which allow the insects' critical moisture to be expelled. Dehydration kills the insects. It's safe for humans and animals to consume this earth since it's so finely ground, but insects who consume it have breathing problems, digestive problems, and reproductive problems. Earthworms are structurally distinct from insects. Thus diatomaceous earth will not damage them. The earthworm is protected against diatomaceous earth by its mucus coat and digestive mechanism, which allows it to pass through the soil that has been treated. It's common for gardeners to use diatomaceous earth as a dusting agent to manage a wide range of insects, including the gypsy moth and codling moth, as well as pink boll weevils, twig borers and other

destructive insects. With an electrostatic charger, the diatomite particles

have a negative charge, making it easier for them to adhere to plant surfaces in field crops and fruit orchards.

Botanical Insect Repellents

Essential oils and crushed leaves of botanicals like citronella, eucalyptus, pennyroyal and clove can be used to make insect repellents. Other botanicals that can be used include thyme, wintergreen and lavender. Repelling ticks and other insects are the four mainstays of the elder, pyrethrum, Ginkgo, and lavender herbal remedies. Insects have little effect on other trees like cedar, quassia, and teakwood, which are naturally insect-resistant.

Botanical Insect Attractants

Insects are drawn to scents and can be deterred from specific crops by the presence of neighboring plants that emit similar scents. For this reason, plants such as mustard and nasturtium, both of which produce mustard oil, are widely employed. Trap crops are what they're called. Trap crops should be removed before the eggs hatch to prevent the spread of insects.

Botanical Insecticides

Insecticides derived from a variety of plants are commercially accessible. Sources cited When used as indicated, these materials are less hazardous to humans than man-made pesticides and break down more quickly. However, they

kill pests and beneficial insects and can be hazardous to other life forms, like fish, so it is important to use them with caution. Always look at the label and follow the instructions carefully when using any type of pest control product.

Roots from tropical plants contain the stomach-poisoning substance rotenone. To make insects unwell and stop them from feeding, a Latin American shrub endemic to Trinidad called Ryania is used.

C. roseum or Chrysanthemum cineraria folium flowers are used to make

pyrethrum. Aphids, harlequin bugs, spider mites, leafhoppers, and imported cabbage worms are just a few of the pests that this plant is effective against, whether used in combination or alone with other botanicals.

In India, a tree endemic to the subcontinent called the neem produces oil from the seeds of the tree's fruit. As a repellant and an appetite suppressant, it is useful against Japanese beetles and many other eating insects. It also prevents the development of larvae.

Also nicotine can be helpful. Since the 17th century, nicotine, and tobacco, the principal alkaloid in the plant, have been employed as an insecticide. Insects and animals alike are poisoned by nicotine, which is a contact poison and must be handled with extreme caution.

The seeds of Sabadilla plant are harmful to many insects when heated or handled with an alkali. While in storage, this quality improves.
Insecticides can be used to control corn borers, cabbage loopers, grasshoppers, codling moths, aphids, webworms, and squash bugs, among other pests. Handle the dust with care and avoid inhaling it.

4.2 GOOD AND BAD BUGS

Although all gardens have "good" and "bad" bugs, just a few are considered to be particularly harmful from a gardener's perspective. Carrots, endives, chives, beets, Egyptian onions, peppers, parsley, and rhubarb seem to have a built-in natural resistance. Depending on the weather, lettuce could also be included in this list.

List Of Excellent Living Trellis Plant Partnerships

- Orach + Fall Peas
- Corn + Pole Beans
- Amaranth + Chayote
- Quinoa + Bitter Melons
- Okra + Currant Tomatoes
- Sunchokes + Cucamelons
- Tree Kale + Runner Beans
- Tithonia + Malabar Spinach
- Sorghum + Asparagus Beans
- Sunflowers + Mini Pumpkins
- Broomcorn + Edible Bottle Gourds
- Kiss-Me-Over-the-Garden-Gate + Gherkin Cucumbers

Insect-resistant vegetables and herbs can be grown near each other. Insects are attracted to different plants for various reasons, which have been extensively studied by scientists. According to the research, insects favor plants with large quantities of free amino acids, which are heightened in

plants that have been badly nourished, as organic gardeners have long known. Organically grown vegetables grown in healthy soils contain lower quantities of free amino acids in their tissues than those grown in soils that have been depleted by the use of chemical fertilizers. Insects find these "organic" vegetables less appetizing. Additionally, pest-resistant vegetable types have

been developed. The Cooperative Extension Service in your county may be able to offer advice on the best options for your particular situation.

Mice

Fresh or dried mint leaves and oils, camphor, and pitch pine all repel mice and rats. When applied in areas where food crops are produced or where kids can pick them up, mothballs deter both mice and rabbits. Mouse-repelling plants include white lavender, wormwood, sea onions, and spurge, while everlasting pea and the leaves of dwarf elders are effective against field mice and mice in grain storage.

Ladybugs

These aphid-killing critters can be purchased and released into your garden, but in small gardens, the challenge is to keep them there. If there is a real need for their skills and if food is readily available, they are more likely to stay. There's a difference in how you let them go. Instead of scattering them like corn seeds, use small handfuls and place them gently around the base of affected plants. They have a built-in instinct to clamber up the nearest tree and begin foraging. Don't handle them roughly when "seeding" because they can become agitated if you do so in warm weather. The finest times are in the early morning or late evening. In addition to the leaf miner, the beneficial ladybug may be found in lamb's quarters. Ladybugs must find aphids in sufficient numbers in order to survive and reproduce once they have been introduced to a new area. This could be cabbage, Chinese celery, or another plant. A female can generate up to 1,000 progeny in a single mating. Around aphids and other early food

sources, you can typically locate the eggs of ladybugs in the early spring. In groups of 5 to 50, they'll be orange or yellow in hue and stand on end. The blue-black and orange-spotted larvae resemble an alligator.

Milky Spore Disease

The grubs of the Japanese beetle are killed by a bacterial bacterium that is commonly utilized. Milky is the name given to the insect's peculiar white hue because of the effect it has on it. To test for the presence of bacteria, researchers in central New Jersey found a few unusually white Japanese beetle grubs in 1933. Efforts were made to cultivate this disease for release by the Bureau of Entomology and Plant Quarantine. In two months, experimental plots treated with the milky spore revealed a death rate of more than 90%. The disease's death toll was just as high in places where it had already spread spontaneously. The beetle has not become a major problem in Japan because of this disease, which occurs there naturally.

In most cases, the spore requires just one application before continuing to spread and multiply itself. It is ideal for treating mowed or cropped regions, although it can be sprayed on the soil at any time except on windy or freezing days. Three to four

feet apart, place one teaspoonful of the spore disease dust on the grass or sod. The beetle grub will ingest the bacteria spores as it feeds on the dirt. Spores infect healthy grubs and give rise to long, slender vegetative rods that divide and multiply in the blood. A short time later, the grub's normally clear blood turns milky, and the grub succumbs to its injuries. As the spores discharged from the grub's body cavity enter the soil, other grubs are also affected. This cycle repeats itself as the number of spores grows as grubs are killed, resulting in smaller populations of adult beetles that can feed on crops. The sickness progresses over time and is self-reinforcing in nature. Trade names for milky spore sickness are numerous. Sources cited Neem oil has proven to be an effective Japanese beetle management method. (Botanical insecticides can be found in this chapter.) The Japanese beetle can be frightened away by growing geraniums near

roses and grapes, which is a less successful but still useful strategy. The beetles will die if they consume the larkspur, while soybeans serve as a trap crop. It is rare for the beetles to cause significant damage to the following crops: cabbages, tomatoes, peas, radishes, potatoes, sweet potatoes, squash, and turnips.

Molasses Grass

Nature's own insect trap, this is. Ticks are attracted to the viscous oil secreted by glandular hairs on the skin's surface. To stop them from crawling up to come into contact with an

animal, it does not kill them. Ticks were found to be absent from Guatemalan cattle that were pastured on this grass, and it has since been introduced to Florida with great success. Cattle enjoy grazing on it because it is a good source of feed. The tsetse fly and mosquitoes are also kept at bay.

Millers and Moths

If fruit tree moths and millers are a problem, mix one cup of molasses with one and a half cups of water and hang the solution from the branches in small buckets or cans. Remove the bugs from time to time or develop a new remedy. Peach trees benefit greatly from the usage of this cure.

Milk

When fed stinging nettle hay or other species of the Umbelliferae family, goats and cows produce more and richer milk. Spraying tomatoes and peppers grown in a greenhouse with skim milk can help prevent the spread of the mosaic virus. The mosaic virus can be prevented by dipping pickers' hands in skim milk or whey proteins while picking commercial tomato and pepper crops. Orchards have employed milk and blood sprays to control fungus and a coal tar and milk mixture to suppress the chinch insect. Sprinkle buttermilk or sour milk on cabbages to keep cabbage worms

away.

Oil Sprays

Dormant oil sprays, when used correctly and at the right time, can be effective against a wide range of chewing and sucking insects, particularly in orchards. Insect eggs are suffocated by the oils, which form a tight layer on top of them. Early spring is the best time to apply strong dormant oil sprays on trees with no leaves. However, in recent years, lighter, more purified oils have been created and can be utilized at any stage of growth.

Mosquitoes

Mosquito larvae in lakes can be effectively killed with garlic-based oil. Myristicin, a synthetic chemical found in parsnips and Bacillus thuringiensis, is efficient as a selective insecticide for the larvae. In the long, chilly western twilights, when I conduct most of my garden work, I find that castor beans grown around my garden make it more enjoyable to work there since they repel mosquitoes. A native American plant is known as "American pennyroyal" or "squaw mint" Euell Gibbons claims it is an effective natural insect repellant. In addition to repelling mosquitoes and gnats, mashed and rubbed on the skin releases a nice aroma.

Hot Pepper

There are few plants in the garden that are beneficial and flavorful as hot red peppers. Spray aphid-infested plants with an infusion made from ground hot peppers, water, and a small

amount of genuine soap powder. Caterpillar-damaged tomato plants can benefit from a dusting of cayenne pepper. Be cautious when spraying tomatoes if you notice long green hornworms. Keep an eye out for tomato hornworm parasitic wasps, which construct white cocoons all over the tomato plant. The sprays you use on these animals might be performing your job for you, so don't use them on them. Eggplants can be protected by rubbing ground red peppers on their leaves, while raccoons can be deterred by pulverizing dried red pepper pods and sprinkling them on the silks of

maize. Onions, ground pepper pods, and a clove of garlic can also be used to make an all-purpose spray. Strain the mash after letting it sit for 24 hours in water. To make a gallon of spray, add enough water. Use many times a day on roses, chrysanthemums, azaleas, or beans to keep significant infestations at bay. The mash should not be thrown away but buried among the plants where insects are prevalent. When working with spicy peppers, wear gloves to protect your hands and avoid getting the liquid in your eyes.

Moles

Earthworms and Japanese beetle grubs are among the moles' favorite food sources. However, moles are often regarded as an annoyance, even though they consume certain valuable organisms. Daffodil bulbs and castor bean plants discourage them, as do a few strategically planted caper spurge plants.

When hawthorns, roses, raspberries, or mesquite twigs are placed into mole holes, the moles will be scratched and bleed to death.

Praying Mantis

Despite its intimidating look, this useful bug will not harm your garden's plants, preferring to feed on other insects instead. In its early stages, it consumes soft-bodied insects like aphids and leafhoppers, but as it matures, it may eat anything from chinch bugs to locusts to beetles to flies to spiders to tent caterpillars and many other creatures. However, the common European mantid, generally found in warm countries, can survive in the northern United States. Large mantids range in length from 2 to 5 inches depending on the species, although they can easily go unnoticed due to their similarity to the plants they rest. Eggs are laid by female mantids, who use a sticky material secreted from their bodies to adhere the eggs to trees and plants. The solidified froth mass egg casings can be found among prickly hedges, brush, bushes, and berry bushes in autumn after the leaves have gone. For your own garden, you can get some from

waste areas and marshes, but don't clean the area completely.

You'll need roughly four egg cases per quarter acre to properly plant them (without shrubbery). Tape or tie the cases to the ground about 2 to 4 feet above the ground in a secluded area. When the mantis emerges in the spring, you can count on it to help you catch a wide range of insects, which are likely to be in

abundance at this time of year. It is imperative that each organism escape the egg by severing the weak connection that ties it to the egg. Dropping and then ascending to the surrounding greenery follows. Mantids can't fly well and move slowly. Thus they like to stick around one area for as long as they can find food. As a result, they are likely to spread and expand their influence. Many young specimen may not survive long, but eventually enough of them will keep the species going. During the months of November and early May, mail-order mantid egg cases are available commercially.

Woodchuck

If you have an annoying woodchuck problem in your area, spray the plants that the woodchucks are eating with a mixture of water and spicy pepper to deter them.

4.3 BIOLOGICAL CONTROL

To keep bugs away from your garden plants, you don't need to use hazardous pesticides. Your garden can grow without your involvement.

To foster the presence of beneficial insects in your garden, stop using chemical pesticides as soon as feasible. These will take care of both good and bad bugs. Sit back and wait for the beneficial insects to find you by creating the right conditions for them to thrive. Those who put forth the effort to construct it will reap the benefits.

Attracting beneficial insects to your yard is as simple as putting flowers. To attract beneficial insects that feed on nectar and pollen from your flowers, you need to grow them. Interplanting flowers near plants that are vulnerable to pests can attract beneficial insects. Maintain a constant supply of nectar for beneficial insects by ensuring that your plants' favorite nectar sources bloom throughout the season. If the flowering season is longer, you should utilize more flowers.

For some beneficial insects, a certain bloom is their favorite. Small, exposed nectaries on shallow flowers with small, narrow mouths are more appealing to bees without the specialized mouthparts needed to take nectar from deep or tubular blossoms. Shallow nectaries are found in the flowers of the following families:

The Asteraceae family includes yarrow, daisies, feverfew, and asters, all of which have small, flat flowers.

Lemon balm (Mentha piperita), peppermint (Piper nigrum), spearmint (Piper nigrum), and indigenous mountain mint are all members of this family (Pycnanthemum).

Parsley, fennel, cilantro, dill, and carrot are all members of the umbel family of plants.

Broccoli, mustard, sweet alyssum, and the basket-of-gold, among others in

the Brassicaceae family, all have flowering stems from which nectar can be harvested.

These are some of the plants we've found to be the most effective at attracting beneficial insects:

- Common yarrows Achillea millefolium and Achillea filipendulina are home to many beneficial insects. Fern-leaved yarrow comes in various hues, from the bright yellow conventional kind to the wild white variety that can be found in fields and roadsides across the country. They do well in bright, dry conditions.
- Lobularia maritima (sweet alyssum) should be at the top of your list of long-blooming, easy-to-grow plants. These hardy annuals bloom all year, from spring until frost. It's simple to start from seed and can be sown directly in the garden in the spring. It has a honey-like perfume and looks lovely in planters or at the front of a border. They are able to flourish in both direct sunlight and some shade.
- Examples of this include marigolds, cosmopolitans, and zinnias. In the garden or as bedding plants, these attractive annuals can be grown until the first fall frosts arrive in the fall, making them ideal for the landscape.
- When in bloom, coriander, dill, and fennel attract beneficial insects and birds. Dill and coriander seeds should be sown weekly or biweekly during the growing season to ensure that you have a constant supply of blooms and leaves for your culinary endeavors. Before usage, let some of your dill and coriander seeds mature in the refrigerator. The seeds can be used in cooking, but they can also be saved and transplanted at a later time.

Get To Know Your Allies

To avoid accidentally killing beneficial insects, it's a good idea to be able to recognize them when they arrive. There are a lot of beneficial insects and spiders in your garden, but I'm only going to focus on a few of them because they're the most commonly known.

Parasitic Mini-Wasps

The sting of these small insects is completely nonexistent. B butterflies and moths, whose caterpillar stages cause a great deal of harm to our crops, lay their eggs within the eggs of these scavengers. There are many different kinds of prey for them, such as the armyworm (except for beet armyworms), alafala caterpillar, bollworm (except for cabbage looper), squash borer (but not the wax moth), peach borer (except for the tomato hornworm), cutworm (except for the codling moth), and tomato hornworm (but not the wax moth).

A mature female pest can deposit up to 300 eggs in her 9–11-day life cycle. According to folklore, grownups eat nectar from little flowers like those on this page. There is a good chance that you won't be able to recognize these wasps because they are so small (less than 1/50th of an inch).

Praying Mantis

A well-known insect eater, the praying mantis, does not differentiate and will devour your beneficial insects if given the opportunity. However, the widespread consensus is that their benefits outweigh this flaw.

Tachinid Flies

Cutworms, armyworms, cabbage loopers, and other harmful insects such as stink bugs and squash bug nymphs, as well as fly larvae and flies, are all parasitized by these beneficial flies. White eggs are laid by the adults on leaves or straight on the body of a victim. Internal parasites, the larvae feed on the host before emerging as pupae and killing it. One too many

generations of tachinid flies can be produced annually.

Syrphid Fly or Hoverflies or Flower Fly

Insects like aphids and other delicate insects can devour up to 60 aphids a day if hoverflies visit your blooms for pollen and nectar. However, the adults seem like small bees, but they don't sting. When they're hatched, half-inch maggots resembling caterpillars emerge from the white, oval eggs produced (single or in groups). Mealybugs, aphids, and other pests are caught and eaten by raising their hind legs.

Lady Beetles or Ladybugs

The classic small red beetle with black polka-dots is possibly the most easily recognizable beneficial insect. If your blooms have

pollen, adult ladybugs will come and lay their eggs in your yard. The larval stage of the ladybug consumes aphids and other damaging soft-bodied pests voraciously, whereas mature ladybugs are helpful omnivorous predators. There are an average of 1,000 eggs laid by ladybugs in a lifespan, and the typical ladybug consumes 5,000 aphids in that period. Plant flowers to entice them, but also become familiar with their larval development so you can leave them alone when it's in their early stages.

Lacewings

If you want to keep your garden free of dangerous pests, you should encourage the adult lacewing to visit your nectar-producing flowers and lay eggs there. Even though adult lacewings eat solely flower nectar, their larvae are known to feed on a wide variety of other insects and their eggs, as well as whiteflies and other aphid-like pests. Predators report that these creatures are the most potent. Laceworm larvae can eat up to 100 insects a day when fully developed.

4.4 DISEASE MANAGEMENT

Although this aspect of companion planting hasn't gotten as much attention as others, interplanting can build plant alliances that help fight disease.

Root-rot infections can be reduced by antifungal chemicals in certain plants, particularly those in the mustard family. In

addition, once sown into the soil, some cover crops act as a biofumigant, reducing the growth of diseases like wilt bacteria.

Because living mulches limit the splash-up effect of soil-borne diseases, such as blight on tomatoes, getting on plant leaves in the rain when it rains, they also help in disease management.

Planting hairy vetch as a cover crop reduces tomato foliar infections. Reducing splash-up and suppressing infections can be accomplished by cutting down vetch and planting tomatoes in the plant debris that remains.

Entomopathogens can enter plants through insect damage, which is why companion planting can reduce pest pressure while also reducing the spread of plant diseases.

Chapter 5: Healthy Gardening

Healthy ecosystems don't grow as our gardens do. Plants do not grow in straight lines, and they are not separated from other organisms in their natural habitat. If you want a happy garden or farm, you need a lot of variety, which is good for both your land and your harvest. One of the many benefits of plants is that they help each other. Taking advantage of these mutually beneficial interactions is an important part of companion planting.

5.1 POLLINATION

For the vast majority of the world's food supply, tiny mammals and insects are crucial. Many of our crops are pollinated by various insects, including bees, moths, butterflies, and wasps.

Flowers are essential to pollinator insects. Attracting these insects requires large populations of a wide range of species. Combining some plant types can provide mutual protection by luring pollinators and repelling pests while also boosting yields.

Importance Of Pollinators

The vegetables and fruit we eat are made possible when pollinators fertilize plants. Without pollinators, many of the foods we eat presently would be far more difficult and expensive to produce.

A good place to start is with bees. Over 66% of the world's crop species and one-third of the food we consume are pollinated by bees. Potatoes, carrots, avocados, and even almonds depend on bee pollen to disseminate and fertilize their plants.

Population declines of bees have been occurring for the past half-century. Between 1980 and 2013, pollinator populations in the East of England decreased by 13%, according to research comparing 228 different bee species.

Pollination by bees and other pollinators would be greatly reduced if they were to become extinct. Pollination-dependent crops and wildflowers could be lost if food costs rise due to this.

These four companion plants can help you attract pollinators to your garden.

Take a look at these four companion plants to help you find the ideal plants for your garden to lure pollinators:

Nasturtiums

Many pollinators, such as cabbage white butterflies and bees, appreciate the nectar and pollen of nasturtiums. Nasturtiums can be grown in pots alongside your vegetables and fruits, or they can be grown on trellises behind your crops if they are climbers.

Nasturtiums are a great way to attract bees to your garden. A favorite of the cabbage white butterfly, these plants are also a great place for them to lay their eggs.

Rather than eating your fruits and veggies, the caterpillars will eat your nasturtiums once they have hatched. Cauliflower is a perfect soil mate for your nasturtiums.

Marigolds

For fruits and vegetables like melon, cucumber, and potatoes, marigolds are an excellent companion plant.

Before planting marigolds, make sure you choose a kind that won't outgrow your other crops. Marigolds can grow up to 1 meter in length. Think about what kind of variety might work best in your garden before purchasing.

Due to their modest size, French marigolds are the most commonly utilized marigold. For a typical garden and vegetable patch, they're the best choice. Bees adore them, which attracts more pollinators to your yard. However, they also keep whiteflies away from your crops, which is a bonus.

Calendula is another popular marigold type among gardeners, thanks to the flowers' great pollinator appeal.

Borage

Like lavender, borage attracts bees and other pollinators like butterflies. To attract pollinators, it has a strong aroma and brightly colored blossoms.

Borage is a wonderful addition to a tomato or strawberry garden. Cucumber-like in flavor, it's safe to eat raw and is often used as an ingredient in salad dressings and dips.

Lavender

Lavender is the finest companion of the bee. Attracting

pollinators is a breeze with this one. Bees are drawn to lavender because of the plant's potent fragrance and simple accessibility to nectar.

It's a great way to attract bees to your garden so they can assist in pollinating your other plants.

Lavender has the added benefit of deterring aphids, a well-known pest of vegetable gardens, due to its potent aroma.

Lettuce, onions, tomatoes, mint, and basil are all good choices for lavender's companionship, as are all of these other plants.

Other Combinations to Try

The following are other coupling that you can try in your garden to favor pollination, which in my experience have worked wonders.

- Summer squash and calendula can be combined; sweet peas can be combined with runners; cosmos can be combined with cucumbers.
- When left to flower, basil attracts a large number of bees. As an added bonus, lettuce and tomatoes boost flavor thanks to this ingredient.
- Self-pollination is a feature of some plants, such as tomatoes. Companion planting for these plants is usually a means of warding off pests. When it comes to keeping nasty bugs away from your garden, marigolds are one of the best options.

- Make sure to plant sage, oregano, dill, and thyme all over the garden.
- Lavender, geraniums, and mint also deter pests from invading the home.

5.2 CREATING A HEALTHY ENVIRONMENT

To maintain a healthy number of pollinators, plant an equal number of flowers and vegetables. Make floral borders or plant swathes of old-fashioned open-pollinated flowers to go around your vegetables and fruits.

Pesticides and insecticides should not be used. Unless absolutely necessary, use them only as a last option. Insect activity is at its lowest in the middle of the day on calm days, so use insecticide only when necessary. Organic items are better. If you apply organic pesticides incorrectly, you could be putting your health at risk. If you use a broadcast spray, useful insects will be harmed, and the pests will return in full force in a few of days.

What's in with what's out

In your garden, decide on the crops that will provide food for your family, as well as other plants that will attract pollinators. If you're a fan of birds, you may incorporate some of their favorite crops into your garden!

Beetles

Flowers such as milkweeds, black-eyed Susans, goldenrods, lobelias, marigolds, and yellow giant hyssop all attract bugs to your garden. Isn't that wonderful? There are a variety of beetles that can be harmful to your garden, such as Japanese beetles, but there are also several beetles that can be useful in the fight against pests that live on the ground. Beetles, too, prefer low-lying plants that shield them from predators and provide shelter.

Butterflies

There are butterfly gardens in science museums and wildlife centers all around the world. Flowering plants with silky wings gathered together is an amazing sight. Some of that charm can be captured by planting nectar-rich vegetation.

Keep in mind that butterflies require food at two distinct stages of their life cycle: as butterflies and as caterpillars. If possible, plan your garden so that it can accommodate both of these life stages.

In addition to the sort of butterfly you'd like to attract, the finest plants to use in your garden will be influenced by the microclimate there.

Bats

It's not uncommon for people to work in their gardens late into the night when the bats begin to frolic in the shadows. It's a wonderful indicator of the season. Bats are important pollinators, but they also serve as a deterrent to mosquito bites. Is there a secret to luring more bats to your garden? Plants that bloom in the dark.

If you've ever dreamed of creating a moon garden, now is the time to do so. Many of our favorite nocturnal pollinators are drawn to the night-blooming varieties of cleome, moonflower, nicotiana, four-o'clock, evening primrose, yucca, and water lilies.

Bees

Because of all the news headlines about bee colonies dying, bee gardens are becoming increasingly popular all over the country. Bees will aid and increase your harvest if you let them live in your garden.

Bees are hard-working little creatures who require food at all times of the year. They enjoy calendula, hyacinth, borage, crocus, and lilac in the spring. During the summer, they'll spend hours examining foxglove, echinacea, bee

balm, and Zinnias, among other herbs. Give them a final burst of color and pollen in the fall with goldenrod and asters.

Moths

Moths are nocturnal flitters who, like bats, seek sweet-smelling scents, much like butterflies. Evening primrose, honeysuckle, and jasmine are all excellent ways to attract moths to your yard.

Hummingbirds

Nectar-rich flowers in brilliant colors can serve as hummingbird feeder substitutes. Colors like scarlet are attractive to birds even though they lack the ability to detect scents.

These flowers are all favorites of hummingbirds: Columbine, bee balm, butterfly bush, lily, Lupine, daylily, and Petunia.

Remember to play around with different heights! Hummingbirds have the ability to drink from as high as 10 feet in the air, yet they prefer to stay on the ground and forage for food. Who or what is the most important person? Those thronging wings require additional space. This is all about where you're flying!

Water Sources

Think about how you may make your garden a more inviting place to spend time as you arrange your companion plantings. As hard laborers, pollinators of every kind appreciate rest areas

and water sources. You can encourage pollinators to spend longer in your garden by providing them with birdbaths, water features, and more.

5.3 PROPER SPACING

The layout of your vegetable garden is just as important as city planning. It's best to interplant flowers and herbs with vegetable areas rather than in long rows. Pests are drawn to large groups of a single species of vegetable.

Pests will have a harder time finding your vegetables if you plant them among flowers and plants. Pests may be confused by the aroma and color changes of flowers and plants, according to this theory. Beneficial insects might be attracted to your garden by planting certain flowers and plants.

5.4 BAD NEIGHBOURS

Growing quickly, crowding others, or using an excessive amount of water, sunlight, or other nutrients is a common occurrence in several plants. There are several that release toxin-delaying or plant-killing poisons. Hydrojuglone, which is produced by the Black Walnut tree, is one example of this. In addition to providing nutrients to the soil, attracting beneficial insects, or confusing insects in pursuit of their host plants, other plants are honorable citizens and conduct good deeds.

The mayor and city planner of your garden city are you, the gardener. You can bring peace and wealth to your community by cultivating plants with excellent partners. You can also easily damage your garden by adding disruptive plants. Plan in advance your garden neighborhoods; to do the use the squared paper at the end of the book.

Some of your garden's companions are best off staying out of each other's way...

Example

Companion planting may not be an option if your garden is small. There are exceptions, of course, if you choose to cultivate plants that are known to grow better together and avoid those that don't. Changing your crops seasonally, as is the case with natural crop rotation, can be an option.

Plants that don't mix well together

It's safe to infer that if two veggies or fruits don't appear to have a good or negative association, it's neutral.

Keep a picture of your garden and a few notes from the growing season each year, and make a note of your accomplishments and shortcomings. In the future, you may see a relationship that may be avoided or that you can use to your advantage.

Brussels sprouts

Brussels sprouts are a must-have if you want to eat from your garden all the way through the winter months. Unless, of course, you're one of those people who can't bear them.

Instead of arguing, let's talk about what Brussels sprouts hate: pole beans, kohlrabi, and strawberries.

Beets

Beets are a laid-back bunch.

Despite this, they will not tolerate being planted near pole beans or field mustard for reasons that are unknown to us.

Because of these two dislikes, you have plenty of land in your garden to grow as many beets as possible.

Corn

Recall the Three Sisters companion planting that was discussed in the previous chapters?

Because beans fix nitrogen in the soil and squash helps keep the soil colder and "weed-free," you may conclude that corn thrives with these two crops.

Tomatoes are the only other plant that corn will not tolerate being planted nearby.

Not only are corn and tomatoes big feeders, but tomato hornworms and corn earworms are attracted to them as well. In general, neither of those things should be allowed in your backyard.

Beans

The beans, like some people, have a preference for their immediate neighbors.

Sulfurous members of the cabbage family, such as Alliums, aren't

welcome in the company of beans.

A good rule of thumb is to avoid planting beans near any of the vegetables mentioned above. You should avoid planting scallions and leeks near your beans, as well as onions and garlic.

Cucumbers

Cucumbers should not be planted in the same bed as sage, melons, or potatoes.

Cucumbers are reported to taste better if they don't have basil growing next to them, so you may want to eliminate that aromatic herb as well.

Cabbage

Cabbage, another excellent cruciferous vegetable, is notorious for taking up a lot of room in the garden because of its size.

It is the pole beans that should be eliminated because they are unsuitable with most Brassicas. Cabbage should never be planted near tomatoes.

Cabbage and basil don't go together either. Keep reading if you'd want to use aromatic herbs to defend your cabbages from pests.

Garlic

Next to garlic, what else should you avoid planting? Garlic cannot be grown with asparagus, peas, beans, parsley, or sage.

Asparagus

That's why it's important to know what asparagus dislikes in your garden. It's not a fan of damp feet! Asparagus, on the other hand, need only one thing: well-draining soil.

The growth of your asparagus stalks is reportedly stunted if it shares space with any Alliums (garlic, leeks, onion). Fennel, too, is going away. Plant it

far enough as possible.

Eggplant

Eggplants aren't finicky about the soil they share with other plants in the garden.

Fennel is the sole non-native plant in this garden, and it should be kept isolated from the rest of your plants because it is said to have no friends.

Fennel is not required for planting eggplant adjacent to legumes like peas and beans, but the added nitrogen will help your eggplant grow. Make sure you don't cover your eggplants with trellised beans to protect them from the sun's rays.

Lettuce

Lettuce has a strong dislike for growing on the same bed as cabbage. They may be vying for moisture or dislike each other's fragrance.

Smaller, like-minded crops like carrots, beets, and cucumbers should be planted close to lettuce in order to maximize the amount of lettuce that may be harvested.

Carrots

I always look forward to cultivating carrots throughout the warm months. To dig them out of the ground, clean them with your hands, and then crunch them to pieces. This is pure joy.

Avoid forgetting the top of your carrot!

Fennel, dill, and parsnips should never be planted with carrots.

Fennel tends to grow alone, which attracts an array of potentially dangerous insects, and parsnips are prone to the same diseases that affect fennel.

This isn't the best of matches.

Kohlrabi

When it comes to vegetables, kohlrabi is an underappreciated one. Hardy plants like this one can be sown 3 to 4 weeks before the last projected frost date in your garden.

Ahead starts on planting and a shorter wait for your 1st harvestable crop are also advantages of this strategy. It's never too early or too late to reap the benefits of your hard work!

Kohlrabi, like the rest of us, has a few food allergies: pole beans, tomatoes, and peppers.

Peas

Take a step back for a second. Did you ever consider peas and onions to be a good match? They can't possibly go together. Garlic is also incompatible with peas, as is said above.

It is best to avoid planting Alliums next to peas at all costs. Yes, you should also avoid planting near chives.

Kale

To make your own crunchy kale chips, you might consider planting some kale in your garden to get the ball rolling.

Although kale, like other cabbages, is susceptible to the same pests (cabbage worms, flea beetles, aphids, and harlequin bugs), there isn't enough antagonism between the two to preclude you from growing them near together.

Those pesky insects, on the other hand, are a cause for concern.

It turns out that growing kale near beans, tomatoes, or strawberries doesn't make it very happy. Basil is not a favorite flavor of kales.

Onions

In the course of your gardening, you may have observed that onions are a

common companion plant. Investigate what they don't want to be planted with next.

Peas, onions and beans (also sage and asparagus) should not be planted next to each other. A safe distance should be

maintained between other onion varieties (such as leeks and shallots) in order to prevent onion maggots from spreading from one crop to another.

5.5 COMPANION PLANTING CHART

Plant	Bad Companion	Good Companion	Notes
Basil	Rue	Asparagus, beets, beans, potatoes, bell peppers, chili peppers, cabbage, eggplant, oregano, marigolds, tomatoes	The output of tomatoes can be increased if basil is grown just a few feet away from the plants. Lettuce's flavor is also enhanced by this.
Onions	Peas, Beans	Cabbage, peppers, chard, carrots, lettuce, tomatoes	Growth and flavor are enhanced with chamomile.
Beets	Charlock, pole beans, field mustard	Broccoli, bush beans, onions, Brussels sprouts, cabbage, chard, cauliflower, kohlrabi	Competition between pole beans and beets will result in a greater yield for consumers. When beet leaves are blended with soil, they add magnesium. When it comes to photosynthesis, magnesium is a key player.
Strawberries	Cabbage family, potatoes, peppers, eggplants, tomatoes	Bush beans, spinach, chives, caraway, lettuce, sage, onions, squash	NONE
Potatoes	Basil, celery, beans, corn, horseradish, garlic, radishes, lettuce, onions, marigolds, peas, spinach	Asparagus, Brussels sprouts, broccoli, cabbage, carrots, cucumbers, cauliflower, eggplant, strawberries, melons, kohlrabi, peppers, squash, raspberries, sunflowers, tomatoes	Harmful insects are drawn to tomatoes, cucumbers, and raspberries. Horseradish boosts the body's ability to fight against sickness.
Asparagus	Garlic, potatoes, onions	Basil, coriander, carrots, dill, parsley, marigolds, tomatoes	Asparagus insects are deterred by parsley, marigolds, and tomatoes.
Beans	Onions, garlic	Beets, peas, chard, carrots, cabbage, cucumbers, corn, radishes	Bean beetles are deterred by nasturtiums and rosemary.
Eggplant	Potatoes	Pepper, Bean	Nematodes are repelled by marigolds.
Cabbage	Tomatoes, Kohlrabi	Beets, spinach, chard, celery,	Cabbage moths are deterred by mint,

		lettuce, onions	hyssop, and sage.
Lettuce	None	Beet, radish, carrot, cabbage family, onion, strawberry.	Aphids are deterred by garlic and chives.
Carrots	Dill	Beans, peppers, onions, lettuce, peas, tomatoes	Carrot flies are deterred by chives and rosemary.
Broccoli	Asparagus, sweet corn, climbing beans, cantaloupe, mustard, pumpkins, peppers, strawberries, watermelon	Basil, bush beans, beets, carrots, chamomile, celery, cucumber, garlic, dill, lettuce, mint, nasturtiums, marigolds, onions, rosemary, radishes, sage, Swiss chard, spinach, thyme	The cabbage fly, which is harmful to broccoli, is deterred by rosemary.
Radishes	Hyssops	Beets, spinach, carrots, cabbage, chives, kale, cucumbers, lettuce, squash	A trap crop of radish plants can be used to defend against some beetles.
Melons	None	Corn, radish, pumpkin, squash.	Beetles are put off by marigold. Bugs and beetles are deterred by the presence of nasturtiums. Oregano is effective against a wide range of pests.
Tomatoes	Corn, kohlrabi, dill, potatoes	Asparagus, parsley, celery, carrots, onions, peppers	Growth and flavor are enhanced with the addition of mint, basil, and bee balm.
Zucchini	Pumpkin and potatoes	Beans, dill, corn, garlic, nasturtiums, marigolds, oregano, radishes, peas, spinach	None
Corn	Tomatoes	Climbing beans, marjoram, sunflowers, cucumber, peas, squash, pumpkins, zucchini	Tomato worms and maize earworms are both attracted to these plants. Nitrogen can be found in legumes like peas and beans.
Squash	Potatoes	Beans, dill, corn, marigolds, sunflowers, peas, radishes, nasturtiums, strawberries,	When it comes to companion plants, squash and pumpkin are very similar.

Pumpkin	Potatoes	Beans, nasturtiums, marigolds, corn, squash	NONE

5.6 SEASONAL GARDEN MAINTENANCE

A beautiful garden may be maintained all year round. It's all about knowing what makes every season different. Working with seasonal conditions rather than against them will be essential to your success in this career path. The ability to anticipate and prepare for seasonal changes is essential when it comes to seasonal growing. Think about what crops are in season now and which ones you may plant now so that they'll blossom at a later date.

A look at the various planting seasons and what variables to keep in mind as you layout your seasonal garden is provided here:

Spring Gardening

Whether you're a rookie or a seasoned gardener, spring is a great time to get your hands dirty. Tempting as it may be, it's best to wait until after the frost has thawed before getting started with planting. However, spring is notorious for bringing with it a significant shift in the growing environment. Depending on when the last frost was in your area, you could consider spring to have three distinct seasons. Mini-seasons are crucial for knowing what plants are in season now and which ones need to wait until later in the spring so you can arrange your garden accordingly.

Listed here are the 3 separate periods of spring:

- **Early Spring**: It's early springtime, and the weather is warming up. It's critical to keep an eye on the soil during these critical weeks. You know it's not ready to plant if the soil is still too difficult to work in. Some cold-tolerant annuals and bare-root perennials can be planted once the earth has warmed up.
- **Two-three Days Before Frost-Free Date:** Your regional frost-free period is the average length when the danger of frost has passed. Retrace your steps back two to three weeks to the beginning of this current date. If your area's perennials are hardy enough, now is an excellent time to introduce them to your garden. You can now start planting perennials in pots and trees and plants in the yard. Because they can withstand a freeze, foods native to the colder months, such as leafy greens, can be planted now.

- **After Frost-Free Date:** Seeding and transplanting annuals and vegetables can begin when the fear of frost has passed. Plants that have not yet blossomed can be safely dug up and divided out at this time. Finally, now is the time to start planting summer-blooming bulbs, including many that aren't hardy or that look like bulbs.

In the spring, it's a great time to arrange your garden's color scheme, but it may also be a delicate period for planting. Think about the flowers and crops you want to plant wherein the spring. Your garden's needs will be taken into consideration as you maximize your space.

Summer Gardening

Gardeners planning seasonal gardens in the summer must take into account a variety of situations and factors. During the hottest months of the year, planting and transplanting might harm plants. Planting bare-root or recently divided plants in the summer is discouraged by experts because of the dangers of the heat. You can, however, effectively plant summer annuals,

perennials, or shrubs that have been cultivated in pots. These plants should be able to withstand the heat and grow all summer long.

Another thing to keep in mind while planning a summer garden is where to plant. Certain annuals can be scorched by the hot summer sun. Planting these in partial or full shade is the only way to go. Your sun-loving bloomers should be placed in a location that receives the greatest sunlight.

If you want to have a healthy and abundant summer garden, follow these summertime planting suggestions:

- The hottest months of the year, July and August, are not ideal for planting. Growing your summer plantings in June is recommended by experts. Planting late-summer flowers, which will blossom in August, can also be done at this time. As a result, you'll only have to worry about your garden during the hottest parts of the year. On hot, sunny days, you may chill out and enjoy your garden without doing any

work.

- Plan ahead and create a Soil Moat if you plan to plant early summer plants that require more watering than usual. Since annuals have such shallow root systems, they lose water quickly. Build a soil trench around each plant to compensate for the increased water requirements. The roots benefit from the water that is filtered by moats when the plants are watered or when it rains. To maximize watering attempts and keep your summertime crops happy, this is just a simple method to do it.
- Planting annual summer plants can be challenging due to the rapid drying of the soil in the summer heat. This is why it's critical to thoroughly wet your bare soil before planting. Continue to water your annuals as you plant them or move them from containers. Even after you've finished planting, you'll need to maintain the soil moist so the roots can establish themselves. Slow, deep, and regular waterings are the best way to keep summer blossoms looking their best.
- You may be able to stretch your summertime garden into the fall with proper maintenance. Remove deadheads on a regular basis. As a result, the plant is able to devote its resources to maintaining healthy blooms rather than generating seedlings. Watering plants throughout the summer is also necessary to help them live longer.
- Make sure to remove all of your summer annuals as you plan to shift into fall. You'll be able to make room for your flowers and any new plants or trees when you do this. Purchasing your container supplies now will save you money if you want to perform container planting in the fall and winter.

Fall Gardening

Fall is a great time to focus on seasonal planting and sustaining a year-round garden. Winter-hardy plants, such as shrubs, trees, and hardy annuals, should be the primary focus of your landscaping efforts. Second, if you want to have spring flowers, you should plant fall bulbs now.

Remember that you may only have a limited amount of time to accomplish this. In order to avoid soil hardening or waterlogging, planting must be done as soon as possible. These situations are unsuitable for planting because the soil is either too wet or too hard to work with.

Getting your garden ready for fall before you start planting is essential. Your primary concern should be eradicating any evidence of disease or pest infestation. This year's blooms could be in jeopardy because you left unhealthy plants in your garden.

Preparing your garden for fall and beginning your autumn planting are some of the following:

- The Soil Needs to Be Cleaned and Nutrified: Remove all dead plants, leaves, and weeds from your garden beds. When all the debris has been removed, you may begin re-fertilizing your soil in preparation for planting. To ensure a bountiful spring, you should feed your soil in the fall. Feed microorganisms with organic amendments and compost. To ensure that the soil is well-oxygenated, rake it well.
- Plants to Choose for the Cold Season That Are Bright and Colorful: Your garden's color doesn't have to fade just because summer is over. In the fall, there are many cold-season perennials and annuals that continue to bloom until the following spring. Fall is a great time of year to cover landscaping spaces with a mix of perennials, shrubs, and trees that provide bright winter berries.

- Fall is the best time of year to grow bulbs that bloom in the spring, so get started now! As a result of the ground's continued warmth, roots can establish themselves before the first frost arrives. Start with the estimated date of the first frost and proceed backward. Soak your bulbs in soil that has been pre-treated, and then plant them in a spot that receives at least some sunlight. 3 to 6 inches apart is a good distance for your bulbs.
- Once your early fall plants are complete, all that's left is routine care. Plants begin to go dormant in anticipation of winter as we get closer to frost-covered mornings. However, there is still a great deal of action taking place beneath the surface. The purpose of winter gardening is to promote steady growth in the spring by engaging in activities like this during the colder months.

Winter Gardening

Winter isn't the best time to plant, but it is ideal for prepping and maintaining your garden. Winter, like summer, presents its own set of gardening challenges and risks. Follow these winter planting ideas to keep your garden flourishing all winter long.

- Take Care of Your Soil Temperature Protecting your plants and soil when the soil hardens and freezes is essential. You'll be able to protect your hardy perennials, shrubs, and trees from extreme temperature swings this way. Uneven ground temperatures are a serious danger to your plants in the winter. The likelihood of this can be reduced by laying down a thick layer of mulch. This helps to keep the soil warm by acting as an insulator.
- Keep Plants Safe from Snow Pile Damage. Because snow acts as a mulch, it can insulate the soil. It is possible, however, that they endanger delicate trees and shrubs by

damaging their limbs and branches. Branches can snap under the strain of the snow and the accompanying low temperatures. Make a habit of routinely brushing snow away from your plants when you see a lot of it piling up. Brush branches using a brush or other soft implement to remove snow. Begin at the bottom and work up to avoid accumulating more snow weight on the lower branches.

- Reduce the Risk of Ground Shifting. Another wintertime concern is the potential for soil to shift. The repeated freezing and thawing of frozen soil can cause it to split. Your bulbs can

be shifted and pushed to the surface if you crack them significantly. Evergreen boughs can be used as mulch to keep the soil in your bulb beds from shifting.

- Even if plants go into hibernation throughout the winter, it is still necessary to give them regular care. Winter garden checks should be conducted at least once a year to search for unhealthy foliage or limbs or pest infestations. The sooner you deal with any of these issues, the better chance your plants have of a long life. It also makes life easier for you when spring rolls around.

A. .....

B. .....

C. .....

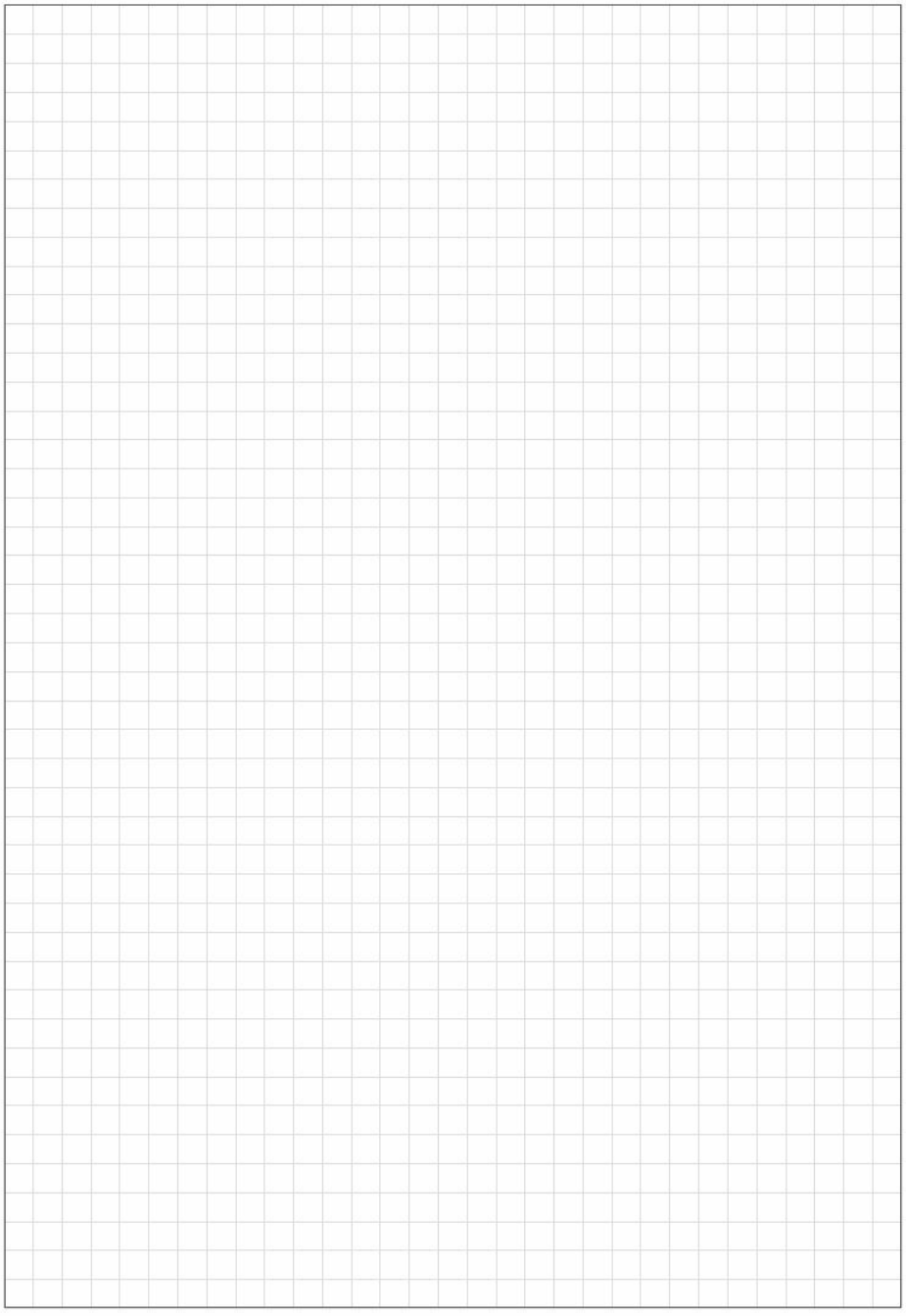
D. .....

E. .....

F. .....

G. .....

H. .....



5.7 WATERING

Plants with similar water requirements should be grouped together in the same area. When growing vegetables with deep roots like tomatoes and asparagus, it's best to group them together in the same bed to benefit from more thorough (but less regular) irrigation.

When watering deep-rooted plants like chard and beans, it is best to only water the 1st few inches of soil rather than watering the entire plant. Soaker hoses can be placed around your crops and attached to electronic timers that allow you to water multiple beds at once.

Compared to other home activities, gardening consumes a substantial amount of water. An eco-friendly outdoor space can be achieved with a little preparation and a few simple modifications.

Plants Watering Techniques

1. **Mulch.** For the soil to retain its moisture, mulching is done by covering it with a porous layer. Mulch can be placed at the base of plants and trees of all sizes so that the soil surrounding them is uniformly blanketed. This decreases the necessity for frequent watering because of less evaporation Weed, and pest growth are inhibited by mulching and water savings. Weeds are suppressed, organic elements are returned to the soil, and water evaporation is slowed as a bonus. Mulching is a win-win-win situation if done correctly. Mulch should be free of weed seeds to avoid spreading problems. Mulch-covered soil makes it easy to remove any weeds that may spring up.
2. **Remove your sprinkler.** Yes, it's easy to set up your oscillating or rotating sprinkler in the garden and then let it go. Even before it hits the ground, some of the water you're using is evaporated. This is a problem since you're wasting a lot of water. Leaves that have been wetted by a sprinkler are more susceptible to fungal

diseases. This is especially true for plants like beans and squash. So why put your plants at risk and drain water simultaneously?

3. **Only water your plants when they are in need of it.** Depending on the size of your garden, different portions of your plot may experience this at different periods. It's difficult to tell when it's time to water. Make a mark in the dirt with your finger. It should be completely dry up to and including the first knuckle and only slightly damp after that. Then, douse it in water. It's well-known that deeper watering, down to 6 inches or so, is healthier for plants' root systems than frequent, shallow watering. Plants with deep roots may last long periods without water. Pre-peak evaporation hours of water in the morning. It's also possible to water your plants at the end of the day, but this doesn't always give them enough time to evaporate their water before mildew, and other issues appear.
4. **Compost your soil to the hilt.** Soil with a higher proportion of organic matter will be better able to retain moisture. We've said it before, and we'll say it again: good soil is essential for growth.
5. **Plant water-intensive crops near to each other.** If you plant tomatoes alongside melons or corn, for example, your water will serve two purposes. Your tomatoes will be well-established once the lettuce is removed from the ground.

Conclusion

Today’s modern gardening arena have mostly abandoned the word "companion planting” in favor of terms like "polyculture," "interplanting," and "edible landscaping”. Planting with a companion has been slammed for being unscientific or excessively folkloric, and its techniques may be a mystery for those gardener who are not willing to explore a hundreds years long knowledge, resulted by the experiences of many gardeners and extremely fruitful results for those that chose to follow suit and listen their plants’ sympathies.

Truth is, mastering companion planting will give you a garden full of healthy plants and a lot of food for your family! It's definitely worth the effort to cultivate plants that can support each other to develop and thrive.

Plant-plant relationships are complex, much like human-human relationships. Certain plants help one another in plant communities, whereas others do not get along. As with humans, plants compete for resources, space, and nutrition.

To get the most out of companion planting, spend some time by getting to know your garden, its soil and environment. Put your soul and heart into what you're doing.

When your garden is ready, do like me: place a seat in a peaceful part of your yard, find your perfect location. Then sit and reflect on what you've accomplished. Breathe in its tranquility with a long breath. Take pride in the fact that you are living up to your responsibilities as a steward of our planet.

To your gardening journey,

Christo Sullivan

Your Garden Plot Plan

Once you have decided you companion planting strategy, you must decide what goes where. This simple charts will help you to visualize and organize your garden in a clear and tidy manner. Planning will save you a lot of time and trial and errors, before moving into action and grow your efficient garden.

The Companion Planting Chart

With this chart you will be able to look in a glance the companions that can go along well, as well as the bad neighbors.

Remember that it’s just for reference and it may vary depending on external factors too (environment, soil, humidity etc). Feel free to update and modify this chart as you monitor how your produce develops.