

# Design and Plant Your Edible Forest Garden

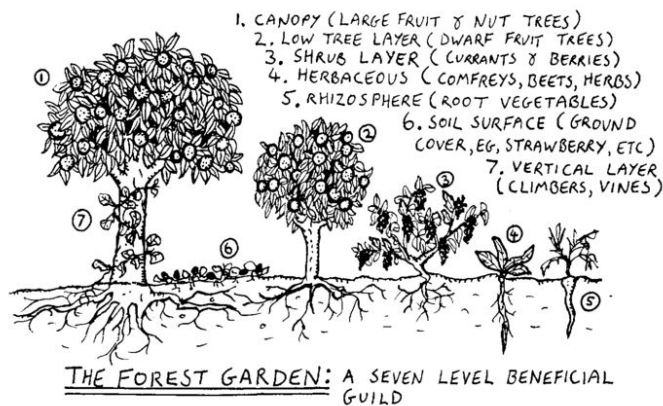
Evening Workshop Course Notes

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## What Is A Food Forest?



A Food Forest is a sustainable gardening system based on woodland ecosystems, comprised of seven main layers of vegetation from canopy trees down to ground covers. Food forests are organized into mutually beneficial plant communities aka plant “guilds” that perform tasks such as nutrient accumulation, nitrogen fixation, increasing pollination, attracting a variety of beneficial wildlife, decreasing the need for weeding and watering, and more!

## Guilds: The Building Blocks of a Food Forest

Guilds are intentionally designed plant communities, where plants are chosen for specific functions, yet they are nearly identical in structure and composition to evolved indigenous plant communities. Plant guilds bring the resiliency and strength of natural plant communities to your food forest design, as well as the benefits of multi-functionalism.

## Food and Medicine

We need energy and nutrients to live, most of which come in the form of food. Food from a food forest can come as fruit, nuts, berries, vegetables, leafy greens, teas, roots, mushrooms, and more! Many plants also have medical properties as well.

Useful species:

- Fruit: Apple, Cherry, Plum, Apricot, Pear, Currant, Gooseberry, Honeyberry, Seabuckthorn, Chokeberry, Gojiberry, Raspberry, Saskatoon, Strawberry, Grape
- Teas: Anise Hyssop, Bergamot, Stinging Nettle, Labrador Tea, Mint
- Perennial vegetables: French sorrel, Rhubarb, Giant Solomons Seal, Lovage, Asparagus, Sweet Cicely
- Mushrooms: Oyster, Shitake, Shaggy Mane

## Nitrogen Fixation

Nitrogen fixer is a type of plant that engages in a mutualist relationship with certain bacteria that are capable of accumulating atmospheric nitrogen into their bodies. When these plants are pruned, or natural root die-off occurs, the bacteria living on their roots also dies, and is eaten by other soil microorganisms and pooped out, thus transforming the nitrogen into a plant available form. This eventually helps meet the nitrogen needs of neighbouring plants.

Useful species: Sea buckthorn, Clovers (white dutch, crimson), Silver Buffaloberry, Carragana,  
Rules of thumb for using nitrogen fixers:

- *Use a variety of species of nitrogen fixing plants that mature at different times during the growing season.*
- *Where possible, use nitrogen fixers that attract a maximum number of nitrogen-fixing bacteria.*
- *Locate higher numbers of nitrogen fixing plants near plants that produce large amounts of foliage.*
- *To best take advantage of nitrogen fixers, place them where you can reach them to induce disturbance.*

### **Dynamic Mineral Accumulation - 5 min**

Dynamic mineral accumulators are types of plants that are known to accumulate above average amounts of certain minerals into their bodies, and generally have deep root systems that dive into the subsoil to “mine” nutrients that aren’t available to more shallow rooted plants. Like nitrogen fixers, when these plants are chopped and dropped to the ground, these minerals eventually become assimilated into the soil, making the minerals available to other plants in the area. Plants depend on a variety of minerals to thrive, with over 20 minerals now considered to be essential for optimum plant health.

Useful species: Comfrey, Horseradish, Strawberry, Dandelion

Rules of thumb for using dynamic mineral accumulators:

- *Diversity is what’s most important - use different kinds of dynamic accumulators, even if they accumulate the same minerals.*
- *Place them where the roots of the plant being supported are now, as well as where they are going to be when the plant is mature.*
- *Allow space for dynamic accumulators rather than tightly grouping them.*
- *Use multifunctional plants where possible that accumulate a diversity of minerals.*

### **Groundcover - 5 min**

One of the most beautiful aesthetic patterns in a garden, the groundcover layer is a class of plants that grow low and thickly. This layer functions to preserve moisture, and inhibit the germination of the seed bank.

Useful species: Clovers (white dutch, crimson), Canada Violet, Chickweed, Strawberries, Bearberry

Rules of thumb for using ground covers:

- *Always ensure that you have a groundcover layer established!*
- *Use more than one type of groundcover to form a groundcover polyculture.*
- *There are two types of groundcover plant forms: runners and clumpers. Use more runners if you want to establish the groundcover more economically, as they will spread faster on their own than clumpers.*

- *Use the right ground cover*

### **Mulch and Biomass Creation**

This type of plant function relates to the the ability of a plant to create large amounts of carbonaceous biomass quickly.

*Useful species:* Rhubarb, Comfrey, Horseradish, Jerusalem Artichoke, Borage

*Rules of thumb for using ground covers:*

- *Use a cover crop of mulch making plants when establishing new plant communities and between islands of established plant communities.*
- *Place express mulch-making plants where you can easily reach them.*

### **Nectary Energy**

Plants with flowers perform a critical role of providing a diverse set of insects with food the need, resulting in increased pollination and fruit production in our gardens. This primarily involves including species that flower during every month of the growing season using flowers of different styles and colours.

### **Shelter and Habitat**

- Logs for predatory beetles, Comfrey for spider over-wintering habitat, Apple leaf litter for ladybug habitat

### **Aromatic Pest Confusion**

Plants with aromatic oils and exudates such as onions, garlic, chives, and marigold have been observed to deter or confuse pests, making it more challenging for them to find their host plants.

### **Barrier**

These plants are particularly good at mitigating the invasion of rhizomatous plant species

- ex . pygmy caragana for quackgrass, comfrey as biological barrier, chives

### **Installation**

The following are methods for preparing a site for planting. In most cases, there will be a host of existing vegetation, whether it be weeds, lawn, or other trees and shrubs that are growing in the place you have deemed to be the best site for your food forest. The below methods are especially suited to dealing with sites that are existing lawns or gardens that have gotten taken over by weeds. Every method deals with the death of these existing plants, resulting in the opening up of a niche in the ecosystem, and an opportunity to establish our new set of food forest species. If we don't take the time and effort to engage in one of these site-prep activities, our gardens will likely become out-competed by the existing vegetation, resulting in slow establishment, stunted growth, and death of the plants that we want to succeed.

### **Sheet Mulch**

Sheet mulching is the act of creating a new soil horizon on top of the existing ground level by adding layers of organic matter, resulting in the immediate creation of new growing beds. Sheet mulches can vary in their shape, size, and materials used, though often contain the following layers:

- A weed suppression layer. This layer consists of impermeable material to prevent existing weeds and other unwanted vegetation from growing up through it. We recommend using unfolded newspaper stacks laid at least 1/8" thick with a minimum of 6" overlap between pieces. Newspapers can often be acquired in bulk through local

publication offices, and are easily unfolded, then laid out across the site; spread out like a deck of cards.

- Compost/ aged manure. This layer adds nutrients, minerals, and microbial life to the sheet mulch through the addition of composted/ decomposed organic matter that is relatively high in nitrogen. It will further decompose in the sheet mulch into humus and eventually healthy soils. You can have one or multiple layers of compost/ aged manure in a sheet mulch.
- Garden soil. Ready-to-plant garden soil is added to facilitate the first several years of plant growth and soil development.
- Mulch. A layer of mulch - generally in the form of fallen leaves, bark chips, or straw - is added as a final cap to the sheet mulch. This insulates the soil, maintaining moisture and slowly decomposing to form the “duff” layer found in natural forest systems.

### **Tarping**

This method requires a longer time frame and a site where it is visually acceptable to have a thick, completely opaque tarp or heavy plastic laid out over the existing ground for up to a year. It is essential to weigh down the tarp very well, and can help to bury it in a layer of mulch. Like a sheet mulch, this method applies an impervious layer that prevents regrowth from existing vegetation. It starves the existing plants of sun, air, and space to grow, resulting in their death and decomposition. Once this process is complete, which can take up to a year, the tarp is removed and the area can be easily cultivated.

### **Solarization**

Solarization is like tarping and sheet mulching in that it also consists of an impervious layer to prevent the growth of existing plants, but instead of relying on suffocating the plants of light, solarization uses a clear plastic layer to let in the sun's rays, creating high heats right at the soil surface, effectively cooking out the existing vegetation. Depending on how much sun your site receives this method will work with varying effectiveness and over varying timescales.

### **Removal of Existing Vegetation**

Especially when transitioning monoculture lawns to food forest systems, this method can be very effective. Using a variety of sod-stripping tools or machines, The existing sod is cut and lifted to a depth of 3-6 inches, ensuring that all (or at least most) of the stalk and roots are removed. If you have enough room to pile up the removed sod and tarp it for a year or two, then you can do so and not have to ship away the organic matter. The open soil can be left for a couple weeks to burn off any remaining grass roots, and then the soil can be amended and planted into.

### **Tilling & Raking out**

If you have a rototiller, or are working with an especially large grassy site, or a very compacted site, this method can be used quite effectively. Existing vegetation is tilled to break up the root mass, and then the surface is raked of plant matter and removed from the site. The open soil is then left for a week or two to burn-off any exposed roots. This process is repeated several times until the grass is completely killed or removed. This method does however destroy beneficial soil biology and activate the existing weed-seeds in the soil seed bank, so it needs to be immediately followed by an aggressive cover crop system to outcompete the weeds.

## **Patches, Islands that Merge**

This strategy involves phasing your food forest over several years, utilizing any combination of the above methods to prepare sites, establish the food forest species you desire on those sites, and then slowly expand these independent patches/ islands until they merge with each other.

## **Maintenance Tasks**

The following tasks are the most common maintenance activities in a food forest:

### **Watering**

Water is essential for life, and there are a variety of things we can do in our food forest design and installation that can help provide the water our gardens need to thrive. Especially in the planting and establishment phases, most of the species we recommend using in food forestry will require supplemental watering to help them get established - usually a few times per week for the first few weeks after planting, and potentially decreasing to once per week for the rest of the first growing season after that. Once the plants are established however, most of these species *will not* require supplemental watering - especially when combined with rainwater harvesting and cover-crop/ ground cover systems.

### **Chop n Drop**

Chop and Drop is the act of pruning, mowing, trimming, and chopping existing vegetation and laying it on the forest floor to decompose; thus adding to the organic matter/ mulch layer and feeding the natural development of healthy soils. Certain species such as comfrey can be included specifically as “chop n’ drop” species, as they accumulate minerals from deep in the subsoil and bring them up into their leaves, essentially acting as a nutrient pump for the food forest as a whole. Many weeds can also be chopped and dropped, though you will want to ensure that their roots are fully exposed to the sun, or that they have not gone to seed. This is one of the most common tasks in managing a food forest.

### **Pruning**

Pruning is a large topic worthy of several courses on it’s own, so we can only provide a brief introduction to this topic. There are many different pruning regimes that one could apply to their food forest, though all of them require a certain level of knowledge of the life cycles of the woody plant species that are to be pruned. In general, always prune at the “branch collar” which is a visible change in the bark pattern where a branch attaches to the tree stem, or where branchlets attach to the branch. It is better to leave a small stub than to cut into the branch collar. The most basic and essential tools to use are pruning shears (also known as secateurs) and a japanese style hand saw (Silky is a great brand). With these two tools you will be able to care for a tree, shrub, or vine, effectively for up to 10 or even 20 years before a chain saw is necessary.

### **Weeding**

Weeding is the act of removing unwanted plants from our garden, and is necessary to varying degrees in our food forests. Firstly, we suggest that all plants be looked at as equals and for a fair evaluation of each “weed” to be done before we label it as our enemy. Dandelion, for example, is one of the most important early-season nectar sources for native pollinators. The entire plant is edible; the sun-dried dandelion root is one of our favorite parts to eat, but the flower heads are also quite delicious if harvested before they ever open, as are the leaves if they are grown in the deep shade and protected from wind. This wonderful little plant is also

especially good at decompacting soil and accumulating a handful of key plant minerals! So the first strategy with weeds is to use them as much as possible before regarding them as a nuisance. Secondly, weeds indicate an open “niche” in the ecosystem, so the main strategy for reducing weeding is to occupy their niche with other living things that we desire, namely the ground cover layer in our food forest. This can be done temporarily by using a “cover-crop” mixture of fast growing, soil building annual crops, and transitioned to perennial plants over time.

### **Mulch & Compost**

Especially in the site prep, installation, and early establishment years we will need to add mulch and compost to our food forests, however as the years go on we can eventually stop adding these materials as the forest system itself will provide them. Once plants are established, and if we have included enough nitrogen fixers and dynamic mineral accumulators, the chop n’ drop and pruning that we perform as well as the leaf-fall and winter-kill that happen seasonally will become enough to provide the function of adding mulch and compost, as these natural processes will be happening in-place in the garden.

### **Generate Disturbance**

As our food forests mature over the 10 - 30 year timeframe, many changes will happen in the garden. Generally, the site will become more and more shady as the canopy grows, and soils will move from being bacterially to fungally dominant. The conditions for growing many annual vegetables will decrease, giving way to plants that thrive in later states of succession. Also, some of our fruit or nut trees may contract disease or pests, or we may decide that we don’t like a certain type of tree that we have growing and may want to replace it with a more desirable species. For whatever reason, we may decide to induce a “disturbance” or become a force of nature in our garden. This may look like removing established trees or shrub hedges to allow more sun into our gardens. It might also look like tilling a given area of your food forest to create more space for growing annual vegetables. In any case, as our food forests grow we will likely find the occasion to make significant changes to the overall ecology to facilitate our changing goals or maintain the site conditions we most desire.

### **Plant Sources form mail order providers**

[Richters Herbs](#)

[West Coast Seeds](#)

[Green Barn Farm](#)

[Norton’s Naturals](#)

[Rhorar’s](#)

[Boughen Nurseries](#)

### **Resources**

[Plants for a Future Database](#)

[Permaculture Plant Database](#)

[Temperate Climate Permaculture page](#)

[Permaculture Research Institute](#)