West Coast Food Forestry

A Permaculture Guide

Rain Tenaqiya

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Contents

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Introduction

Since Robert Hart[1] coined the term 'forest garden,' a major movement has begun to create people-oriented forests to satisfy our vital needs in a sustainable way. Variously called "forest gardens," "homegardens," "food forests," or "analog forests" (with numerous local names), these anthropogenic ecosystems are revolutionizing industrial culture's relationship with Earth. Utilized for millennia by horticultural peoples in the tropics, they are now being designed by permaculturists, international conservation and aid groups,[2] anthropologists,[3] agroecologists,[4] and others as an alternative to exploitative conventional agricultural and forestry practices.

The basic principle in designing these forests is to create an ecosystem of plants which are appropriate to their context, mimic the structure and function of the local flora, and serve humun* needs. They may be based primarily on timber species or, more commonly, on food and medicinal plants. Stephen Gleissman defines a forest garden as:

> an ecosystem of humans, plants, animals, soils, and water, with trees playing key ecological roles. It usually occupies a well-defined area, between 0.5 and 2.0 hectares in size, in close proximity to a dwelling. Rich in plant species, [forest] gardens are usually dominated by woody perennials; a mixture of annuals and perennials of different heights forms layers of vegetation resembling a natural forest structure. The high diversity of species permits year-round harvesting of food products and a wide range of other useful products, such as firewood, medicinal plants, spices, and ornamentals.[5]

Forest gardening is a central practice of Permaculture, an ecological design strategy for sustainable living. Permaculture's design principles and methods (see **Appendix**) are invaluable in the creation of forest gardens which are productive and harmonious within the greater landscape (including the social "landscape"). In a typical Permaculture forest garden, you are likely to find plants for all uses. However, in very limited space, a 'food forest' may be the best choice.

A food forest is a garden with at least three layers of food plants. My specialty is food forests, and the main focus of this book is on plants that can be included in food forests on the West Coast of North America, primarily the areas west of the Cascades and Sierras. I have spent my life living and gardening from Bellingham, Washington to Big Sur, California, and grew up outside of Portland, Oregon. The plants listed in this book are suited for this region (usually for USDA Zones 8 and 9, unless otherwise noted), though many of them can be grown throughout North America and other temperate regions.

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[1] See Robert Hart's *Forest Gardening: Cultivating an Edible Landscape* (Chelsea Green, 1996).
[2] See the various projects of Counterpart International, Inc. at www.forestgarden.org.
[3] See the work of Anabel Ford at http://marc.ucsb.edu/elpilar.
[4] Gleismann, S. R. *Agroecology: Ecological Processes in Sustainable Agriculture.* Lewis Publishers, 2000.
[5] Ibid.

* I use this spelling to avoid the androcentric connotations of "human," and to draw attention to our origins in humus.

The seven layers of a food forest.

Two of the main justifications for growing food forests are that perennial plants require less labor and cause less destruction to the land. These two facts are really one fact: perennials require less energy to grow. For this reason, many people are modifying their diet to include more perennials. Emphasis is being placed on perennial vegetables to replace annual vegetables and on perennial legumes, grains, and nut trees to replace legume and grain field crops. Chestnuts and other nut trees are especially relevant since our current diet is so heavily based on wheat. Chestnuts can be dried and ground into flour with characteristics similar to wheat. Other nuts can replace a portion of the wheat flour in recipes, and offer superior nutrition. While annual crops like potatoes, soybeans, and quinoa may still be part of a future ecotopia, perennials will regain their importance to our sustenance.

How to Use this Book

This book is intended for experienced gardeners west of the Cascades and Sierras (see map below), who have already studied Patrick Whitefield's *How to Make a Forest Garden*, an excellent guide to the design and installation of food forests. Another prerequisite is Toby Hemenway's *Gaia's Garden: A Guide to Home-Scale Permaculture*, which places food forests in their wider Permaculture context. In an attempt to avoid covering topics that have been written about elsewhere, I have only briefly defined unusual terms and have provided references to other books that explore these topics in detail.

In **Section 1**, I first discuss some of the particulars of the West Coast which are relevant to growing food and working with the land. Creating a sustainable lifestyle (or permaculture) is something that has to be done region by region, and here I try to sum up what I have learned about how to live within the wild flows particular to this region. Next, I go on a tour of some of the existing food forests on the West Coast. Much knowledge and inspiration can be gained from observing what other people are doing. Why reinvent the wheel?

Section 2 is the heart of the book and consists of profiles of the plants I feel are appropriate for West Coast food forests. Spreading the word about the amazing diversity of food plants that can be grown in this region was the main impetus for writing this book, and I hope it inspires more people to turn their yards into food forests. To this end, I have created charts, in addition to the plant profiles, to help in food forest design. The **Fruit and Nut Harvest Seasons** charts allow one to design food forests that spread the yield out over the whole year, so that there is always something to eat from the garden. The **Plant Characteristics** lists catalog plants according to various traits, allowing one to design for specific sites or for specific functions.

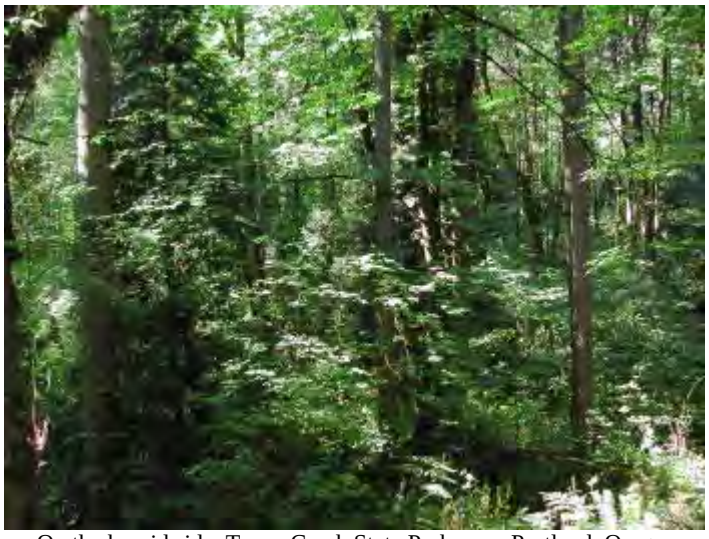
In the **Appendix**, I have tried to sum up the essence of Permaculture, a system of ecological design which can be used for the design of food forests, as well as for the larger ecosystem of which it is a part. By using these principles and design strategies, one can create systems that are largely self-maintaining and ecologically sustainable.

Region Covered by this Book

Section 1: West Coast Food Forestry

Special Characteristics of the West Coast

The West Coast has traits which make it different from the rest of North America, and which are important to consider in the design of food forests. This is a reflection on some of those traits and their influences on food forestry. It is important to remember, however, that the West Coast varies from dense, coniferous rainforests to hot, arid grasslands (see the pictures below), so it is crucial to work with the conditions of each specific site.



On the humid side, Tryon Creek State Park, near Portland, Oregon

On the arid side, Potter Valley, near Ukiah, California

Climate

The West Coast has a Mediterranean or semi-Mediterranean maritime climate, which is found in only a few regions on Earth. Heavy Winter rain is followed by dry Summers which typically receive only 1 to 8 inches of rain at low elevations from May through September (except along the ocean north of Coos Bay, Oregon, where Summer rain is higher). In most cases, irrigation is essential to plant establishment, and required indefinitely for many plants the further south (and east in California) you go. Like the storages of salmon, acorns, and berries that sustained unusually high numbers of Native American peoples in the region, water storages are essential to survival here. These can be above-ground, as with ponds and water tanks, or in the soil, as with swales[6] (level berms), keyline plowing,[7] wood buried in swales, pits, or trenches, and soil organic matter. The importance of humus in the soil to hold water (in addition to many other functions) cannot be overstated and many permaculturists are ever-hungry for sources of organic matter. Water conservation is equally important and can be accomplished through drip irrigation, heavy mulches, windbreaks, and many vegetation layers which create shade and block evaporation (as in a food forest). Maintaining a diversity of irrigation water sources, such as rainwater catchments, springs, ponds, and tanks, is also wise, in case one of these sources fails. Plants can also be a water source. One of the ways to bring water up to the surface is through the use of deep-rooted species such as trees and other perennials and even some annuals. In addition to reducing evaporation by blocking the wind and sun, the water that these plants transpire creates a moist microclimate that reduces water stress for the plant community as a whole. Deep-rooted trees may even share water with their neighbors through interpenetrating root systems. In areas with fog, plants can condense water on their leaves and add significantly to

[6] See Hemenway, *Gaia's Garden*, p. 83.
[7] See P. A. Yeoman's *Water for Every Farm* (Second Back Row Press, 1981).

the soil moisture during the Summer. The taller a plant is, and the more leaf surface area it has, the more water it can collect. Redwoods can obtain a third or more of their yearly precipitation this way.

Because of the dry Summers, the most widely distributed native trees here tend to be conifers and other waxy-leaved evergreens which can conserve moisture during the Summer and also take advantage of our mild Winters to continue storing sugars. Native deciduous trees (other than oaks) are less common on the West Coast (outside of riparian areas) as most need a steady supply of water while they are growing leaves. Unfortunately, other than pine nuts and acorns (which are a pain to leach of tannins), native trees here don't have a lot of choice food to offer. While we do have an abundance of native berry-producing shrubs (all of which will fruit in the shade) food forests on the West Coast must be composed primarily of domesticated exotic plants if they are to sustain modern US appetites, especially if we want to minimize our consumption of animal-derived foods. Fortunately, an abundance of food plants will thrive here in our mild climate and varied geography.

The ease of establishing these plants on a site is dependent on the aspect (it can be difficult for plants to get established on bare, south and west-facing slopes), soil type, proximity to water sources, and vegetation structure. A plant that is growing among other plants and that has a good layer of mulch around it will do better than an isolated plant in bare soil. However, some sites are so hot, dry, and/or rocky that pioneer and nurse species need to be established first in order to create an environment suitable for less hardy species (see *Gaia's Garden*, pp. 117- 120, for a discussion and list of nurse plants). Using larger plants that have been grown in a pot (to minimize root disturbance) can also help. Many established food plants can survive on the West Coast without irrigation, though most plants will grow faster with additional water up to a point. The choice of whether or not to irrigate permanently and how much to irrigate depends on the environment, proximity to the house or community center (see **Sectors** in **Appendix**), and how much plant diversity or food production you want. At least one to three years of irrigation are required to establish most species, depending on the location (plants take longer to establish in drier and hotter areas). Here are two examples of possible irrigation schemes. In Eugene, Heiko Koester recommends weekly irrigation for one or two years, followed by deep waterings every three weeks thereafter. In California, away from the immediate coast, I would recommend irrigating at least twice a week for three years, followed by weekly waterings thereafter for all but the drought-tolerant species, some of which need no additional water. For a good primer on irrigation, see Robert Kourik's *Drip Irrigation for Every Landscape and All Climates: Helping Your Garden Flourish While Conserving Water* (Metamorphic Press, 1992).

At the other extreme, our wet Winters also have their effects. Wet parts of the West Coast have soils somewhat similar to tropical rainforest soils in that they can be leached of nutrients, especially nitrogen. (This may be another reason why evergreens do so well here, as they don't have to shed the nitrogen in their leaves every Fall). This makes nutrient cycling and maintenance of soil organic matter levels even more important here than elsewhere. Nitrogen in the form of humunure[8] and urine[9] should be utilized to nourish food forest soils, along with other composts. These need to be covered during the rainy season and distributed after the rains have diminished to avoid leaching. Nitrogen-fixing plants should be interplanted with other species. Extensive mulching and composting to maintain humus levels will ensure that the soil is able to retain this nitrogen, along with other nutrients. In the north, the cool Winters and often heavy soils prevent organic matter from breaking down too fast, so it's not too hard to keep humus levels high. (In fact, the 500 year old Douglas-fir forests of the Pacific Northwest have the highest organic matter levels in the world). But in the south, and especially on sandy soils, it can be difficult. Growing heavy mulch-producers such as comfrey, alfalfa, and empress

[8] See Joseph Jenkins' *Humanure Handbook* (Jenkins Publishing, 1994).

[9] See Carol Steinfeld's *Liquid Gold: A Short History of Urine Use (and Safe Ways to Use It to Grow Plants)* (Chelsea Green, 2004).

tree (*Pawlonia tomentosa*) is a good idea. Permanent cover crops can be used to protect and nourish the soil, while deep-rooted plants can bring up nutrients. In order to prevent erosion, leaching of nutrients, and loss of nitrogen and humus through oxidation, soil should never be left bare. It is likely that the rhizosphere (the area around a plant's roots loaded with mutualistic microbes that help feed the plant) is even more important here and inoculating soils with mycorrhizal fungi can really benefit plants. Soil disturbances such as tilling should be minimized.

Saturated Winter soils pose other problems, as well. In marshy or other areas with poor drainage, planting on mounds of at least 1.5 feet high makes it possible to grow species with moderate drainage requirements. In coastal California, particular soils combined with Winter rain leads to pervasive slumping, especially on steep, overgrazed grassland slopes. Adding swales to the picture can actually make matters worse by causing oversaturated soil to slide. Reduction or better management of grazers, planting trees, and installing slightly off-contour swales (at no greater than 1% slope) to redirect water to ridges or storages can help. The Permaculture maxim to hold water on the land for as long as possible obviously doesn't apply here. At sites with excess Winter soil moisture, water can be encouraged to drain off the land (ideally to ponds or tanks) until sometime in the Spring, after which local soil water storages are employed to capture the last of the rain. By this method, Heiko Koester believes enough water can be held to keep plants watered until August 15, after which most species start to go dormant and don't require as much water (evapotranspiration is highest in July). One way of applying this idea could be to use off-contour swales to drain water away during the middle of the wet season, after which they could be blocked up to allow water to accumulate and slowly percolate into the soil.

Spring can also be a rough time for plants on the West Coast. Our relatively mild Winters encourage plants to come out of dormancy early, while temperatures can be erratic, leaving flowers and tender new growth vulnerable to late frosts. Species that are prone to this problem can be planted under other plants which will hold warmer air in place during the night. They can also be placed on a north-facing slope or north of a structure or tree which will encourage the plant to emerge later in the season and still receive enough light in the Summer. I once planted a peach and an apricot in a south-facing heat trap behind a house which shaded them during the Winter but allowed them plenty of heat and light during the Summer. They are both doing very well! In coastal northern California, intense winds late into the Spring (and often during Summer afternoons) can be stressful for plants. Hedgerows, windbreaks, and careful placement of sensitive species will result in faster growth, greater fruit production, and less water use. These methods can also help with the early cold snap in late September or October that can prematurely end the growing season for some species.

While less hardy plants should only be a minor part of any food forest design, they are definitely worth growing and a few tricks can make it easier. Locate tender plants near thermal masses such as water, rock, and walls of buildings which can absorb heat during the day and release it at night. Avoid applying nitrogen after August, as it can result in weak shoots that are prone to frost damage. Pay attention to annual or ornamental plants that you know are especially sensitive to frost and use these to indicate when you need to give tender perennials special care. When extremely cold temperatures threaten to kill a special plant, mulching high up on the plant's stem, covering the plant with plastic, sheets, or other material, and irrigating around the plant can help save it. Spraying a plant with water can also warm it up, but don't leave it wet overnight as excess water can freeze and damage leaves or even break off branches with its weight. Sometimes, a moderate, ongoing spray is safer during the night. Remember that absolute temperatures are only part of the picture. Plants need to be hardened off gradually by increasingly colder nights. A sharp drop in temperature can be more damaging in the Fall than an extremely cold night in the middle of the Winter.

With these factors in mind, it should be noted that food forests are a good choice for the West Coast. With their deep roots, high mulch production, microclimate effects, and long life cycles, trees and other perennials seem a good fit to what the region has to offer. Perennials allow one to build on what has been accomplished in the past, without disturbing the soil and exposing it to the elements.

Geography

Because of the rugged terrain and coastal influence, the West Coast has a high concentration of microclimates. Sites at the same latitude and elevation can be radically different from each other. For example, when I was living at Lost Valley Educational Center southeast of Eugene, at around 800 feet, I felt I was high in the mountains it was so cold. Yet at similar elevations nearby, the growing season was one to two months longer. This is because the other places were on south-facing hillsides rather than in a frost pocket near the bottom of a valley. Permaculture places great emphasis on locating homesites on south-facing aspects about halfway up the slope (or at least 100 feet above the valley floor), and it is possible to grow subtropicals further north if you follow this advice. However, some places in California are so hot in the Summer that a southeast-facing or other aspect might be best. For a good discussion of the use of microclimates, see Robert L. Stebbins and Lance Walheim's *Western Fruit Berries and Nuts: How to Select, Grow and Enjoy* (HP Books, 1981).

In California, the Mattole Valley/Garberville region on the coast, and Redding in the Central Valley, seem to be the northernmost extent of a climate warm enough in both Summer and Winter to grow a wide range of subtropicals outside, such as citrus, avocado, and loquat. But even here, a warm microclimate and good design are necessary. Warmth at night is just as important as warmth during the day to ripen certain fruits. In Oregon and Washington, there are areas in the rainshadow of the Coast Range and Olympics that I've often thought would be better for growing peaches and other Sun-lovers. The rainshadow effect is so pronounced northeast of the Olympics that prickly pear grow native on many of the islands southeast of Vancouver Island. The southeast of Vancouver Island is also pretty dry. Another warm microclimate exists in the Umpqua River Valley in Oregon. Here, the marine influence keeps Winters mild but doesn't infringe on the warmth of the Willamette Valley Summers. For descriptions of the climate zones on the West Coast, see the *Sunset Western Garden Book* and *Western Fruit Berries and Nuts.*

Microclimates also make a difference for insect populations. Combining a sheltered microclimate with our mild Winters can ensure that beneficial species survive the cold. Diverse plant species (including those that flower in the Winter), multiple vegetation layers, and protection from wind can produce overwintering habitat for predacious and other beneficial insects. This makes them readily available in the Spring and removes the lag time usually required for predatory insects to colonize the site and catch up with pest species.

Coastal Fog

Fog has a dramatic effect on life along the entire coast, having a major influence on how and what food plants to grow. Fog diminishes as you go higher and further inland, though river valleys running east-west into the ocean can experience fog further ashore. For areas with a lot of fog, it isn't really worth growing heat-loving plants. Certain citrus and grape varieties can still yield, and avocadoes can be ripened in a bag, but in general, heat-loving plants will not produce much in the fog. Slugs (and sometimes snails) are also much more of a problem in the fog zone. Many plants (especially young plants) can't grow fast enough to keep up

with them. The extra moisture can also cause increased fungal problems. In general, it is a good idea to grow plants that like cool temperatures and low light levels, space disease-prone plants further apart than normal for better air circulation, and avoid putting young and tender plants out until they are large and tough enough to cope with the critters. (Incidentally, the brown garden snail (*Helix aspersa*), which has become abundant in California, was introduced from France for escargot. Many of my friends have benefited from their protein, but I'm not there yet.) For more information about gardening in the fog, see Pam Peirce's *Golden Gate Gardening: The Complete Guide to Food Gardening in the San Francisco Bay Area and Coastal California* (Sasquatch Books, 1998).

Fire

Fire is a reality for nearly every terrestrial ecosystem on the West Coast. Until the last century, even the moist, dense, coniferous forests of western Cascadia had 'cool' understory fires every 100 years or so and 'hot' crown fires every few hundred years. Most other places burned more often. Fire suppression has led to less frequent, but more intense fires. Food forests next to open land (especially grassland and chaparral on south and west-facing slopes and ridges) have a better chance of surviving if they are designed with fire in mind. Flammable plants should not be planted in the fire sector, while fire-resistant plants should be well-irrigated and kept free of dead material. Most deciduous trees and shrubs are fire-resistant, while flammable plants tend to have narrow leaves, lots of dead branches, aromatic leaves and sap, and loose bark. Firebreaks, such as roads and ponds, and high moisture, fire-resistant, or fire-retardant plants (such as succulents), can be placed in the likely fire sector to reduce the chances of all your hard work going up in smoke.[10] See **Plant Characteristics** (in **Section 2**) for a list of fire-resistant plants.

Fungi

In forest ecosystems, much of the biomass, hence life, is in the soil. Humus and decaying wood support saprophytic fungi, while mycorrhizal fungi feed off sugars from living plants. Fungi can be very nutritious (some even contain vitamin B12) and at least a few species can be cultivated or intentionally introduced into food forests. Areas with hot and dry Summers will have a narrower window for mushroom harvesting, but it is still worth the effort.

Shiitake (*Tricholomopsis edodes*), oyster (*Pleurotus ostreatus*), matsutake (*Tricholoma magnivelare*), enoki (*Flammulina velutipes*), nameko (*Pholiota nameko*), and chicken of the woods (*Polyporus sulphureus*) mushrooms grow directly on wood, preferably of 4- 14 inches in diameter. Other mushrooms, such as blewit (*Lepista nuda*), shaggy mane (*Coprinus comatus*), wine-red stropharia (*Stropharia rugoso-annulata*), garden oyster (*Pleurotus ulmarius*), and morels (*Morchella* spp.), grow in mulch and can be introduced by dropping bits of the desired mushroom's gills around. Mycorrhizal fungi, like boletes and chanterelles, can also be successfully propagated this way. However, many fungi are host-specific and will only grow under certain species of plants. Make sure you positively identify any fungi you eat as many can make you sick or dead.

It is worth inoculating food forests with mycorrhizal fungi, whether edible or not, due to their ability to feed and water their plant hosts. Mycorrhizal mycelium can increase a plant's root surface area by 100,000 times and this is especially useful in our leached, Summer-dry soils. Inoculation can be as simple as spreading around some soil from a local forest, but there are inoculants for sale, as well. For fungal inoculants and specific instructions on the cultivation of mushrooms, contact Paul Stamets' company, Fungi Perfecti.[11]

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[10] See Bill Mollison's *Permaculture: A Designer's Manual* (Tagari, 1996) pp. 451- 456.
[11] Go to www.fungiperfecti.com.

One of the most common diseases affecting trees and shrubs on the West Coast is oak root fungus or honey mushroom (Armillaria mellea). This fungus spreads by white or yellowish mycelium (fungal threads) and by black, root-like structures called rhizomorphs. It can be detected by peeling off the bark of the base of the trunk or of the roots of the tree in question where the fan-shaped mycelial mats should be seen. The bark should feel spongy and smell mushroomy. Another way to tell if oak root fungus is present is if you see the dense clusters of mushrooms that sometimes form on and around trees infected with the fungus. These just happen to be one of the most popular edible mushrooms, passing for shiitakes when cooked.

Oak root fungus often occurs in areas that were previously oak forest which are now being irrigated. It can survive on decaying stumps and root remnants for up to 50 years, slowly expanding outwards to infect new hosts. Trees often live with the fungus for many years before dying. Killing infected trees only provides more food for the spreading mycelium. If a tree is found to be infected, exposing the tree's root collar can help slow the fungus down. Give extra special care to other trees and shrubs nearby, being careful to avoid waterlogging or overwatering the soil. It is best to avoid irrigating under most native trees altogether. Plant resistant species to create a barrier to the fungus, or to fill in a dead tree's place (see **Plant Characteristics**).

Pocket Gophers

In some areas of the West Coast with loamy or sandy soils, gophers can make gardening a nightmare. Watching a beloved plant being sucked into the netherworld, or finding that a suffering tree has no roots, can make a person contemplate *Caddyshack* methods of gopher elimination. In the short term, the only reliable solutions that I know of are trapping the varmints or fencing them out with wire cages. However, gophers prefer the soft, succulent growth provided by annuals and young perennials, and once a perennial is established, gophers become less of a problem. In addition, gophers seem to avoid forest, so a densely-planted food forest free of grass should eventually have little gopher activity. Unfortunately, gophers love clover and I've heard of a mature fig that was toppled and turned into a hedge by gophers after clover was planted around it. In any case, it can't hurt to increase habitat for barn owls and gopher snakes. In addition, planting a diversity of species, including plants that gophers pretty much avoid (such as *Salvias*, marigolds, and geraniums), can help to make it harder for gophers to find their favorites.

Gophers seem to be one of the West Coast species (along with voles and deer) whose ecological niche includes grassland preservation. Since creating a food forest in an open area is antithetical to the work of gophers, we need to imitate the successional patterns of forest establishment and work in ever-expanding patches and edges. Gophers do perform valuable ecological functions, such as aerating and incorporating organic matter into the soil and improving the infiltration of rain into the ground, so hopefully we will eventually find a better way to live with these creatures. Anybody have a good recipe?

Native Rootstocks

The first choice in plants should always be species that are native to the West Coast or other Mediterranean climates (see **Plant Characteristics**), if they can satisfy your needs. However, native plants can also be used as rootstocks for other plants. Black and English walnuts have long been grafted onto California black walnut (*Juglans californica*). The Bullocks, on Orcas Island, Washington, have been successfully grafting apple cultivars onto Pacific crabapple (*Malus fusca*) for many years now. This rootstock is drought-tolerant and also thrives in wetlands. Apples have also been grafted onto serviceberry, and pears can be grafted onto black

hawthorn. Possible rootstocks for stone fruits include Klamath plum (*Prunus subcordata*) and desert apricot (*Prunus fremontii*). Naturalized exotics may also be used for rootstocks, such as mazzard cherry (*Prunus avium*) and garden plum (*Prunus* X *domestica*). One fantasy I haven't yet tried is to graft a hardy avocado onto a California bay laurel!

Invasive Exotics

While I do advocate using exotic food plants, I do not advocate using invasive exotics, unless they are already so prevalent that they are considered "naturalized." In **Section 2**, I have tried to indicate which plants might be invasive, but this will vary according to the region. Plants that are totally new to the West Coast should be tried out on a small scale and watched closely, at first. However, over thousands of years, many of the plants (useful or not) we introduce to the West Coast will eventually adapt and join the local flora. Many exotic food plants have already done this, at least on a local scale. This list includes almond, black walnut, Spanish chestnut, English walnut, apple, avocado, cherry, European pear, loquat, filbert, apricot, crabapple, hawthorn, mountain ash, peach, and European plum, just to name the trees. Pears are already considered invasive in wetlands of the Willamette Valley. In addition, exotic plants sometimes carry diseases that can kill native plants, such as the chestnut blight brought with Chinese chestnuts that wiped out the entire population of American chestnut on the East Coast. Given the negative impacts that exotic plants may have on the local ecology, how can we justify their use?

My view is that if a plant is truly useful and does not displace an unreasonable number of native plants in the wild, then we should use it. This is based on the current global crisis of humun overpopulation, overconsumption, and destructive technologies. We desperately need a viable sustainable culture for the benefit of the entire planet, and I believe that useful exotic plants are a necessary part of this emerging culture, even if they inevitably carry risks. On the other hand, there are many native plants which could be a lot more productive and useful if they were selectively bred with sustainability in mind. These could eventually replace species brought from other parts of the world and would have less negative ecological impact.

Grasslands

Despite the important focus on the near extinction of old-growth conifer forests on the West Coast, grassland species are in even more trouble. Grasslands range from southeast Vancouver Island (British Columbia) and Whidbey Island (Washington), through the terminal moraine deposits of the last glaciation near Olympia, south to the Willamette Valley, southern Oregon, and much of California. California's Great Central Valley used to rival Yellowstone in wildlife. Now, most of these grasslands are dominated by exotic grasses and are overgrazed or have been converted to something else, with many of their original species near extinction. Ironically, much of the loss of these grasslands is due to the destruction of Native American cultures. Native American peoples maintained these grasslands for the last 10,000 years through the use of fire. Now, the forests are being allowed to creep into the grasslands, ending a 10,000 year old relationship. Early European immigrant reports from the Eugene area describe a nearly treeless plain, outside of the riparian zones. From the Douglas-firs on the edge of the Willamette Valley to the oaks on the edges of innumerable California meadows, the forest is closing in.

What to do? Considering the West Coast population increase since the 1800s, the Native use of the land seems inappropriate on a large scale, due to its dependence on a sparse and mobile population. But I do believe that enough grasslands should be preserved to maintain the biodiversity present before Europeans arrived. In addition, grasslands that are still part of a significant

roadless area should be avoided for settlement and food forests, as with all other wild areas (see **Set of Ethics on Wild Systems**, under **Permaculture Ethics and Principles** in the **Appendix**).

Temperate Design Considerations

Because food forests are still relatively common in the tropics, food foresters have looked there for inspiration. Many scientific studies have been made of tropical forest gardens and these have found that they consist of 20 - 600 (usually 50 - 100) species, in 2 - 5 (usually 4) layers (not counting the root and vine layers), and average less than .5 hectares (1.25 acres) in size.[12] However, each of these traits is heavily influenced by social factors, such as family size and time available for gardening, as well as climatic factors, which may not correspond to West Coast conditions. How should food forests be designed differently in the temperate world?

Most people on the West Coast have access to at least a small area of land, but are very busy and have few other people to help them in the garden, unlike in the tropics where labor is typically plentiful. In addition, land values for much of the West Coast are very high, resulting in even more busyness in trying to pay for land and property taxes. Too many plant species (each with its own needs) and too large of a garden can lead to chaos and neglect. Even so, I have found 50 - 100 species to be quite manageable, which fits with the tropical average and which is capable of providing a rich diet, among other things. For someone with limited gardening time, fewer species might be wise, at least in the beginning.

Appropriate garden size depends on garden complexity (it is helpful to group small plants of the same species together so you can find them), esthetics, and time available for garden maintenance. Complex designs can achieve more with less space, but generally require more maintenance. A wild garden, on the other hand, mostly takes care of itself, by definition, but will produce less food. Regardless, gardens should be designed for minimal maintenance. A good size for most people might be an area of 50 feet by 50 feet. This is a much smaller garden than the tropical average, but is enough space for a canopy of nine short trees or one tall tree and is more appropriate to West Coast culture. Those with more time could increase the size of their food forests accordingly, expanding in realistic stages.

On the other hand, high land prices encourage us to find ways for the land to pay for itself, as is essential in most tropical countries. The need to create a financial income means that food forests should ideally produce some things that can be sold for money. Whether food forests create products directly (such as through the sale of fruit) or indirectly (such as through education programs or tourism), it would be beneficial to design them with income generation in mind. Value-added products, such as dried fruit, shelled nuts, or jams, bring in more cash than fresh produce, but fungi (such as oyster mushrooms) and medicinal herbs also have high market value. Unfortunately, removing biomass from the land (in the form of bulky food items such as fruits and nuts, especially) requires a return of at least nutrients, and the only sustainable way to do this that I know of is to redistribute composted municipal sewage sludge (currently 54% of the sewage sludge in the US is used to grow forests, grains, fruits, and vegetables). Whether this can be done without fossil fuels and without adding harmful chemicals or heavy metals to the soil remains to be seen.

[12] Fernandez, E.C.M., and P.K.R. Nair. 1986. An evaluation of the structure and functions of tropical homegardens. Agricultural Systems. 21 (4): 279-310.

High land prices also make it harder for the average person to obtain land with which to practice food forestry. Land access is a serious problem throughout the world and one that needs serious attention. As globalization continues to concentrate the ownership of land into fewer hands, we need ways to make land available to as many people as possible. Community land trusts,[13] cooperatives, grants, and other methods for creating long-term access to land are sorely needed. Some of these methods may also guarantee the preservation of existing food forests, to make sure that they avoid the all-too-common destruction endemic to quick land tenure turnover.

Probably the most obvious difference between tropical and temperate conditions is the amount of solar radiation, and this has a direct impact on the number of possible layers in a food forest. In the tropics, even banana and citrus can fruit in the shade, unlike here. For dense food forests in limited space (such as near a house), I usually exclude the tall tree layer, or relegate tall trees to the north side of the garden (assuming that this works for the neighbors). Where space allows, plants can be placed further apart than in conventional orchards or landscapes, enabling more layers. Trees, and even shrubs, can be pruned up, thinned out, or cut back to allow more space and light for the understory. The hottest areas of inland California should have no problem with all seven layers, however, especially if the tall tree layer consists of pines, palms, or leguminous trees such as black locust (*Pseudoacacia robinia*) or silk tree (*Albizia julibrissin*) which only cast light shade. Conversly, temperate food plants include a higher proportion of deciduous species, allowing the use of different layers over time, possibly enlarging the number of potential layers. Rick Valley reports good results in western Oregon using conventional orchard spacing. The best design includes a diversity of approaches, which allows for us to learn what is best for each site. (I like to plant the same species in several microclimates, when possible, to see what happens.)

A Word about Guilds

Permaculturists use the term ‘guild’ to refer to an arrangement of mutually-beneficial organisms or elements (usually plants). Guilds can be constructed and used as units which can be placed together to form larger guilds. It could be said that this is the essence of Permaculture. Currently, there is a lot of interest in creating lists of plants for guilds centered on food trees for use in food forests. However, each guild has to be modified for each environment in which a tree can grow resulting in endless lists. As an example, for black walnut on the West Coast there are at least four different environmental parameters (irrigated/ non-irrigated, neutral/alkaline soil, wet/dry Winter soil, light/heavy soil) resulting in 16 different combinations which would require 16 different guilds. While these lists have their use, the important thing is to identify the ecological functions that you want performed in the guild (i.e. nitrogen-fixation, weed-suppression, mulch production, pollination, etc.) and to do a needs and yields assessment (i.e. What does a plant need? What does it yield?) for compatible guild plants in order to choose an appropriate combination. Learning how to design guilds for each site is more important than having authoritative plant lists. Observe the ecological functions being served on nearby wildlands in similar conditions (elevation, aspect, wind, soil, moisture) and mimic these.

Conclusion

It is possible that the West Coast is more prone to catastrophic change than some other parts of Earth. The young age of the landscape, proximity to the Pacific Ocean and tectonic plate boundaries, and Mediterranean climate create the conditions for earthquakes, volcanoes, fire, wind, erosion by water, and landslides. Through humun society, the land is subject to waves of immigrants and exotic species, as well as clearcuts, mines, stream channelization, roads, dams, grazing, agriculture, and urbanization,

[13] Visit the Institute for Community Economics at http://www.iceclt.org.

which only accentuate the instability of the region. As Permaculture designers, we try to create people-oriented ecosystems which take these factors into consideration and try to moderate them. A permanent ecosystem that provides food and other vital necessities saves energy and decreases the amount of land disturbance elsewhere. While this book focuses on food forests, we should try to keep the big picture in our minds as we design gardens that will be of lasting benefit to the surrounding landscape.

The West Coast has been a leader in the movement to create sustainable culture since the 1950s, as the examples in the next few pages illustrate. We are gifted with a mild climate, relatively intact wildlands, a diverse landscape, and a diverse humun population. Food forests should become a part of West Coast culture, replacing the obscenely wasteful lawns and ornamental landscaping that we have inherited from the past. This is, I believe, one of the best ways we can honor this amazing place we call the 'West Coast'.

Food Forests of the West Coast

The following are a sampling of some of the most established food forests on the West Coast. Since food forestry is just beginning here, it is hard to find mature examples, but these gardens are as diverse as their creators and have been a huge inspiration for me. Each one is least 4 years old and has at least three overlapping layers of food plants.

Bullock Brothers', Orcas Island, Washington

Widely regarded as the oldest Permaculture site in the United States, the Bullock brothers have been working on their food forest for over 20 years. Fruit and nut trees mingle with vibrant wetlands, forest, vegetable gardens, and flower beds over the varied soils and topography that make this site a rich experiment in sustainability. The diversity of species is unusual, as is their use of microclimates, unconventional planting techniques, and native rootstocks. Beginning with an abandoned parcel covered with blackberries and a drained wetland, Doug, Joe, and Sam went to work planting fruit and nut trees and other soil-building plants, and began to restore the wetland. In a classic example of stacking functions, they used the soil from the wetland restoration project to build up fertility in the new food forest, helping to jumpstart succession. Their goal has been to use good design to minimize labor and material inputs into the food forest, while maximizing yields.

Grape growing up plum and apple with currants, kale, borage, and more below.

Plum covered with grape, currant beneath.

One technique that illustrates this philosophy is the planting of a nitrogen-fixing shrub, such as Siberian pea tree or gumi, with a fruit or nut tree in the same hole. The shrub fertilizes the tree, acts as a living mulch, and produces food while the tree matures, maximizing the use of the space and saving work on fertilizing, weeding, and irrigating. If the shrub starts to shade out the tree, it can be cut back and used for mulch. Eventually, the shrub gets shaded out or becomes part of the understory. Another technique they've used is to graft apple cultivars onto pre-existing native Pacific crabapples (which can also tolerate the wet, clay soil better than domesticated rootstocks).

Some parts of the food forest look wild, with dense interpenetrating branches and vines. Elsewhere it is more like an orchard, with annual vegetables in neat rows under the trees. Either way, their approach seems to be working as the gardens always have something to offer the endless stream of visitors that come to marvel at their work, and to learn how to replicate it at home.

Chicory, mint, comfrey, and currant under ginkgo.

Young paw paw and fig with ginger, currants, and bamboo below pear.

Jude Hobbs' Residence, Eugene, Oregon

Jude at work in her food forest.

Looking into Jude's food forest from the edge.

Jude Hobbs is one of Oregon's most senior Permaculture teachers and counts a landscaping business among her many projects. When she first moved to her present home, it was a shady site with a canopy of Oregon ash and black walnut, an understory of English ivy, and heavy clay soil. Over the last 14 years, she has turned this 1/3 acre into a lush forest garden with as many as six

layers of vegetation, including vines. Her food forest is really a collection of forest islands, which allows for a lot of edge. Though the majority of plants are not edible, there are a good number of food plants in each layer. The rest of the plants include ornamentals,

Bamboo and hazelnut hug a fig on the north side of the garden.

wildlife attractors, natives, medicinals, and flowers. Jude is somehow always finding space for new plants. Her gardening formula is: "Soil prep., planting, harvesting, biomass." No biomass leaves the site, and every 4 years she has the city deliver 7½ yards of leaves. She stores extra mulch in piles hidden under the trees and is always on the lookout for more. She also grows bamboo for mulch, as well as for kindling and building material. Jude fertilizes with droppings from her rabbits and every few years she brings in an additional 240 pounds of rabbit poop and leaf bedding from a local rabbit farm. The irrigation water is partly from stored rainwater, and she is planning on expanding this.

Here one can see strawberries under daylilies under currants under bamboo under the canopy.

In the shade of the black walnut, Oregon ash, and black locust overstory, there are fruiting fig, hazelnut, blueberry, honeyberry (the only happy ones I've seen), and other plants. There are also raspberries producing decently with only a quarter of a day's worth of sunlight. Jude has observed that the black walnuts seem to lower the productivity of the understory but doesn't worry much about it as a diversity of plants are still able to do just fine. (She has also noticed that self-sowing plants don't reproduce much in her abundant mulch.) Unusual plants include Siberian pea tree, pineapple guava, akebia, sausage vine, Chinese mountain yam, and oca.

Du-Ma Cooperative, Eugene, Oregon

This four year old food forest is a collaboration between Heiko Koester, of Urban Ecogardens, and the Du-Ma housing cooperative. Occupying 1/8 of an acre, this site has a hot microclimate and poorly drained soil, and half of the garden was once a gravel parking lot. Now there is a diverse forest closing in of around 70 species, of which about 60% are food plants.

In the former parking lot, pioneer shrubs such as gumi, Autumn olive, *Ceanothus*, seaberry, and prinsepia have been planted to create shade and add organic matter. Pioneer trees include fig, black cottonwood, and chitalpa (*Chilospsis* X *catalpa*), a hybrid that produces a lot of biomass and flowers all Summer, which Heiko recommends for hot sites. On the north side of the garden, big trees

This corner is packed with pineapple guava, seaberry, fig, che, prinsepia, and English walnut.

Asian persimmon, jujube, chokecherry, and seaberry stand above the smaller shrubs.

such as ponderosa pine, che, and Douglas-fir were planted, extending the existing forest on the neighbor's property. Heiko advocates planting big trees in urban areas (for which Eugene is famous) and tries to plant at least one in each of his designs. Throughout the garden, mounds have been created for certain plants to help with drainage, and species which tolerate poor drainage have been chosen, such as medlar and Asian persimmon. Heiko is experimenting with swamp plants from around the US for use on poorly drained sites.

Heiko stands under the chokecherry, among chokeberry, highbush cranberry, and native twinberry.

Heiko peers through a paw paw under the apple tree.

The south side of the garden is filling in faster due to its shade, better soil, and parts of it already have a forest character, with three layers of overlapping vegetation. The perennial vegetables, herbs, and groundcovers in this garden are admittedly underrepresented, however, due to the presence of quack grass, which is being shaded out gradually rather than sheet mulched or removed.

Seaberry, persimmon, peach, and paw paw among the shrubs.

Unusual plants include: timber bamboo (*Phyllostachys vivax*), Cornelian cherry dogwood, jujube, paw paw, yellowhorn, fragrant Spring tree, Klamath plum, chokecherry, blue banana bean, chocolate berry, seaberry, prinsepia, pineapple guava, and an edible *Podocarpus*. Heiko is also trying out various edible *Viburnum*s.

Alice Pueschner's Residence, Eugene, Oregon

Heiko Koester has been working with Alice's suburban garden (or Wonderland, as it is popularly known) for 14 years now, and it shows. Edibles, natives, and ornamentals blend together to form a mature edible landscape with several vegetation layers and over 170 species. While much of the garden has a canopy of Oregon ash, the understory consists mostly of three layers of food plants. It is here and at the margins of the ash forest that the food forest is to be found. Ten foot tall hazelnut, elderberry, paw paw, hawthorn, yellowhorn, apple, cherry, and plum trees can be seen with thimbleberry, salmonberry, currant, gumi, ramanas rose, flowering quince, emerald carpet, Pacific blackberry, trailing currant, Cascade Oregon grape, waterleaf, and other food plants underneath (the herb and groundcover layers are admittedly sparse of food plants). Other unusual species include hickory, blue banana bean, Jostaberry, Chilean wintergreen, and sunchoke.

Flowering quince and paw paw with blue banana bean in the back.

Red currant, hawthorn, thimbleberry, and apple crowd under ash.

Apple on left, thimbleberry in center, candelabra-like paw paw in back.

Heiko and Zephyr peak through gooseberry and gumi.

R. rose, b. banana bean, gooseberry, blueberry, flowering quince, plum.

Bush cherry and hazelnut hang over thimbleberry and waterleaf.

Lost Valley Educational Center, Dexter, Oregon

This food forest was created out of part of an abandoned pear orchard during a Permaculture Design Course in the Fall of 1996, with the guidance of Oregon Permaculture teacher Rick Valley. Occupying a space of about 50 X 50 feet, this site is very wet, with blue clay not far under the surface. Buried wood trenches were created to help with drainage and to retain water during the Summer, and a woven cascara pole fence was installed around the perimeter. Native wetland plants such as black hawthorn, Pacific crabapple, black cottonwood, and willows were planted next to the fence to eventually replace it. After being neglected for three years, the garden was redesigned, renovated, and extensively planted in the Summer of 1999 by myself and two apprentices. Special features included living willow chairs and fence woven out of a pile of discarded willow cuttings which took root, two hugelkultur mounds (planted compost piles), and a raised bed which provide well-drained planting sites, a pergola and trellis for vines, and a tire pond. I continued planting and maintaining the food forest on my own until I left Lost Valley in the Fall of 2000, bringing the number of species in the garden up to around 90. Unfortunately, another period of neglect followed and many of the second round of plants have also died. Significantly, natives and the *Elaeagnus* species had a higher survival rate. The willows got out of hand and were recently removed. Grass covers most of what is left of the understory. Still, the Forest Garden survives and contains a diversity of plants, demonstrating the power of perennials.

The main entrance to the Forest Garden.

Pear on left and apple on right, with thimbleberry, blueberry, and comfrey surviving underneath.

Pacific crabapple with a graft of 'Granny Smith' planted with Autumn olive, native Nootka rose, lovage, and wild ginger.

Pear with California hazelnut, salmonberry, currant, chives, salad burnet, and comfrey underneath.

Living fence of cherry, salmonberry, willow, snowberry, and rose.

Living fence of black cottonwood, willow, black hawthorn, Pacific crabapple, Mayhaw, and red-osier dogwood, with comfrey planted at the base.

Davis Bynum Winery, Healdsburg, California

After reading an introductory text to Permaculture, Hampton Bynum decided he wanted to get away from grape monocultures and hired Mike Collins of Sonoma Permaculture to do a design for three acres. The design was installed during the Winter of 1999- 2000 and consists of various agroforestry systems, including food forest, all planted on the berms of swales. The swales were sheet mulched using wastes from the winery, including grape fiber, cardboard, and paper filter pads. Due to difficulties in the wine business, the garden hasn't been maintained as well as Hampton would like. But as he points out, a good Permaculture design should do pretty well on its own, and the garden seems proof of this.

Tagasaste, mulberry, and peach over citrus, raspberry, and pineapple guava, over comfrey, daylily, mint, and strawberry.

Apple and Japanese raisin tree with violet, mint, garlic chives, marigold, and grape and an overstory of coast live oak.

Seaberry over pineapple guava and grape with taro, daylily, artichoke, comfrey, and strawberry underneath.

Willow, mulberry, fig, medlar, and tagasaste over filbert, grape, raspberry, plantain, mint, and strawberry.

Hampton's main design criterion was diversity and I would say he has succeeded very well. All seven layers of the food forest are represented here and numerous ponds dot the landscape, many in the bottom of the swales. Pioneer trees such as willow, tagasaste, and black locust have been planted to enrich the soil and provide shade while the ground is covered with multifunctional herbs and salad plants such as chicory, dandelion, plantain, valerian, yarrow, and numerous clovers. The underlying soil consists of

Willow, fig, and mulberry over pineapple guava and citrus over sunchoke, raspberry, strawberry, plantain, and violet.

Peach over pineapple guava and grape over daylily, lavender, and comfrey.

heavy clay with a shale bedrock. Hampton says that the swales have resulted in unusually fast tree growth and that the shale is actually breaking down into a workable soil. Unusual species include: avocado, numerous citrus varieties, Japanese raisin tree, medlar, mountain ash, olive, paw paw, chokeberry, gumi, hops, pineapple guava, seaberry, groundcherry, houttuynia, sunchoke, taro, and yacon.

Chadwick Garden, University of California, Santa Cruz, California

This Biointensive garden was started in 1967 with the direction of Alan Chadwick. While not designed as a food forest, it breaks convention as vegetable, flower, and herb polycultures are grown beneath dwarf fruit trees, and the perimeter of the garden is planted with standard fruit trees, resulting in food forest edges and patches. Avocadoes, figs, loquats, plums, persimmons, and citrus hang over pineapple guavas, elderberries, and dwarf citrus, peach, apple, and pear trees, while comfrey, perennial herbs and flowers, and annual vegetables constitute the lowest layer. Two or three passionfruit vines in the garden constitute a vertical layer, as well. Steve Irving, an apprentice for two years now, assures me that this hand-worked garden is much more productive per area than the UCSC Farm, which uses tractors.

Comfrey and lavender under pear and apple trees.

Comfrey, lavender, and currant under apple, plum, and citrus.

Lavender under dwarf apple under standard plum.

Comfrey and rose under peach, apple, pineapple guava, and loquat.

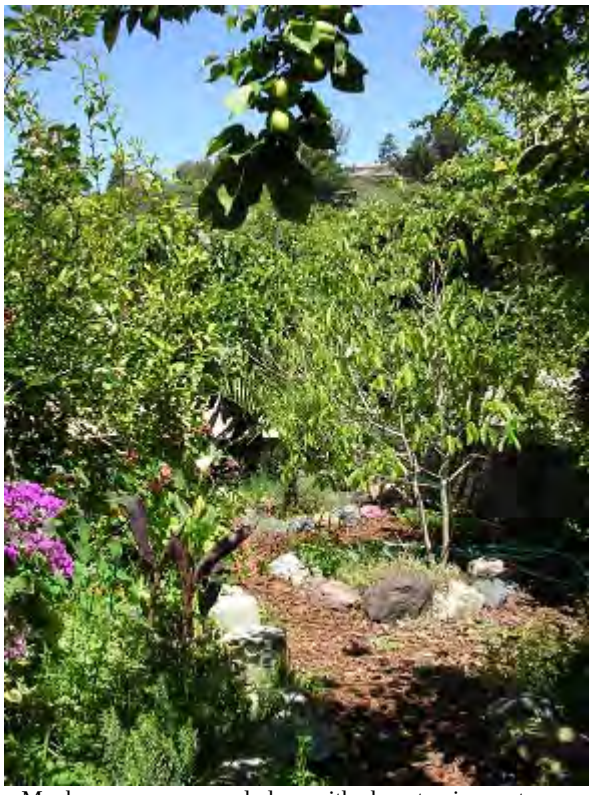
Terry's Food Forest, Santa Cruz, California

You name the fruit tree and it is likely Terry has grown it. Over the past thirty years, he has packed his small yard with an incredible diversity of food plants, building up the multi-layered food garden that is present today. He has used his 1800 square feet to try out everything from Japanese raisin tree and marginal hawthorns to cherimoyas and other tender tropical plants, such as a tall papaya which once graced the premises. Frost and his own sense of taste thin out the visitors from the permanent residents.

Starting out with a conventional lawn and heavy clay soil, Terry gradually added food plants, compost, and mulch, and built raised beds until there was no trace of the turf. From this point on, the design process has pretty much consisted of pulling out

existing plants and fitting new ones into the resulting gaps, much as food forests are managed in other parts of the world. Terry says he is now growing 80- 90% of the fruit he and his parents consume, with neighbors and friends consuming a fair share, as well. In fact, Terry's garden has become so popular that he asked me not to publish his last name. He doesn't want to become a permanent tour guide!


Terry with plum, jelly palm, cherry of the Rio Grande, and loquat along sidewalk.


Mayhaw, paw paw, and plum with chayote vine on top, vegetables and herbs below. An apricot hangs overhead.

Permaculture Center Santa Cruz, Corralitos, California

Vince Pastori started planting this redwood ridge with food plants in 1994. Now his rambling gardens include food forest patches with an incredible diversity of edible and otherwise useful plants. The warm microclimate of this site allows him to grow tree tomatoes, avocadoes, citrus, and white sapotes at 1000 feet and the fertile forest soil and chicken manure have resulted in quick plant growth, as with a sapote that has grown 20 feet in 8 years.


Fig, plums, and grape over pineapple guava, milk thistle, horseradish, and canna.


Fig over strawberry guava, fennel, and lemon.

Tree tobacco and tree collards frame the entrance to the food forest.

White sapote over fig and pineapple guava viewed from fig and strawberry guava.

Section 2: West Coast Food Forest Plants

Food Forest Plant Profiles

This list comprises all of the food plants capable of growing outdoors West of the Cascades and Sierras which I deem worthwhile and appropriate for food forests, excluding the sun-loving herbs. There are many others which I have somewhat arbitrarily left out or have never heard about. Of the 239 plants listed here, I have actually seen 216 of them and have had some experience growing 194 of them. It should be recognized that much of this information is microclimate-dependent, so will vary from site to site. Flowering and harvest times will begin later in cooler areas. 'Drought-tolerant' is a relative term. Use this list only as a rough guide. The plant Zones I refer to are from the USDA system. I have also included a set of lists by plant characteristics to help facilitate food forest designs (see **Plant Characteristics**). This is an ongoing project, so I would greatly appreciate any corrections or additions. See my contact info at the end of the book.

I have been very reluctant to include information about deer-resistance because it is so variable and unreliable. However, I have labeled a few plants as deer-resistant if they can remain in relatively good condition without deer protection, **once established**. Deer will remove the new growth from almost any plant, but tend to avoid the mature growth of tough, waxy, evergreen, thorny, or oily plants. Obviously, all trees are deer-resistant after they have grown beyond the deer browse level (typically around 5 feet, though deer will occasionally stand up and rip branches down).

It is very important to remember that varieties of the plants listed here can be radically different from each other. Having the right variety can make all difference in whether a plant thrives on your site, tastes good, or produces at all. This includes rootstocks. Please consult neighbors and local nurseries about **disease-resistant** species and varieties that will grow in your particular site and fulfill the functions that you are designing for. Unusual or "marginal" plants should first be tried out on a small scale (and in different microclimates, if possible).

Please note that it is a good idea to try new foods in small quantities at first, to be sure that your body doesn't have an unusual reaction. New flavors and textures sometimes take a while to get used to, so don't dismiss a plant's gift after tasting it only once.

Tall Nut Trees




Almond (*Prunus amygdalus* or *dulcis*)- 20- 30 ft x 30 ft attractive tree produces nutritious nut. Semi-dwarfs also available. Nuts are 22% protein, 53% fat, and high in Ca, Cu, Fe, Mg, Mn, Zn, vit E, and riboflavin. Drought-tolerant. Needs full sun, well-drained soil, and hot, dry Summers. Vulnerable to late Spring frosts, so late-blooming varieties are often essential. Dislikes wind. Likes alkaline soil. Somewhat fire-resistant. Remove 20% of oldest fruiting wood annually. Susceptible to oak root fungus. Harvest nuts when shells split to beat the squirrels. 'Hall's Hardy' and 'Reliable' (see listing under Short Nut Trees) are the best for coastal California and further north. 'Hall's Hardy' produces thick-shelled, strong-flavored almonds and is disease-resistant and partially self-fertile. Some people say that its nuts need to be boiled to remove their bitterness. Flowers Febr- April, ripens Aug- Oct.




Black Walnut (*Juglans nigra*)- up to 120 x 60 ft tree usually grown for its fine, rot-resistant wood, but also for its nut which contains 30% protein and 59% fat (and has an extremely thick and hard shell, though thinner-shelled varieties are available). Nuts are high in Cu, Mg, Mn, and vit B6. Fast-growing. Tolerates wetter soil than English walnut, but not year-round saturation. Will grow in heavy clay. Prefers alkaline soil. Wind and drought-tolerant. Disease and fire-resistant. More productive with multiple varieties. Excretes chemicals toxic to certain plants (allelopathic especially to apples). Casts heavy shade. California black walnut (*J. californica hindsii*) is often used as a rootstock for English walnut, needs no irrigation, and is resistant to oak root fungus. Flowers March- June, ripens Sept- Nov. Propagated by stratified seeds.




Bunya Bunya (*Araucaria bidwillii*)- 90- 120 ft tall and 60 ft wide evergreen shade-tolerant tree related to monkeypuzzle grown for its 1 ½ inch, chestnut-like nuts. Slow to bear. Hardy to 18°F. Grows in most soils. Salt-tolerant. Two needed for pollination. Deer-resistant. Casts light shade. Flowers June, ripens Sept- Oct. Propagated by seed.




Chestnut (*Castanea* spp.)- numerous varieties reaching 30- 60 ft tall and wide (European chestnut [*C. sativa*] can get up to 100 x 100 ft) grown primarily for its sweet nut, being compared to potato (5- 10% complete protein, 9% fat), and also for its rot-resistant wood. An 8 ft dwarf Korean chestnut (*C. crenata*) is also available. Nuts are high in Cu, Mn, B vitamins, and vit C and do not store long unless dried, stored airtight in sand, or refrigerated, but they can be used like other grains and ground into flour. Drought-tolerant. Does not like wet soil. Prefers acidic soil. Need two for pollination (can plant two in one hole). Easy to grow. Yellow in Fall. Can be coppiced for nuts and wood. Blight-resistant varieties (usually hybrids with

Chinese chestnut [*C. mollisima*]) preferable. European chestnut is resistant to oak root fungus. Casts heavy shade. Flowers July, ripens Oct- Nov. Propagated from seed (yields in 5- 7 years), root suckers.




English or Persian Walnut (*Juglans regia*)- 40 ft tall and wide tree grown for its nut (18% protein, 65% fat, and high in B vitamins, vit E, Cu, Mg, Mn, and omega-3 fatty acids) and its fine wood. Dwarfs of 12- 18 ft are also becoming available. Prefers well-drained soil, but tolerates clay, drought, and a wide pH. Vulnerable to late frosts. Temperatures above 100°F can destroy nuts. Fire-resistant. Better pollination when grown in proximity to other walnuts. Easy to grow. Fall color. Susceptible to oak root fungus. Not as allelopathic as black walnut (inhibits *Solonaceae*). Reportedly repels flies. Flowers March- June, ripens Sept- Nov. Propagated by seed.



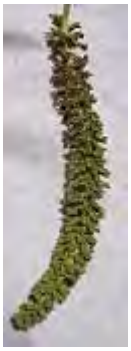

Ginkgo (*Ginkgo biloba*)- 35- 70 ft tall and 24 ft wide tree grown for its beauty, memory-enhancing properties, and for its tasty, peanut-sized nuts. The 10% protein and 4 % fat nuts must be cooked, taste somewhat like potatoes and are high in K, Cu, B vitamins, and vit C. Can be grown in most soils and in the shade, and is tolerant of air pollution and drought. Dislikes wind. Fire-resistant. Needs both sexes for pollination. Bright Fall foliage. Rotting fruit has unpleasant scent which keeps squirrels away. Disease and pest-resistant (including oak root fungus and deer). Casts light shade. Flowers April- May, ripens Oct- Nov. Propagated from cuttings.




Gray Pine (*Pinus sabiniana*)- native tree 40- 80 ft tall and 30- 50 ft wide. Previously known as Digger pine. Produces large cones with pine nuts (28% protein) after 10- 20 years. Needs well-drained soil, but tolerates poor, heavy clay and drought. Flammable. Easy to grow. Need two for nuts. Susceptible to oak root fungus, otherwise disease and deer-resistant. Casts

light shade. Allelopathic. There are many other species of nut pines available. Flowers April- June, ripens Jan- Febr. Propagated by seed.





Heartnut (*Juglans ailantifolia cordiformis*)- 40 ft beautiful Japanese walnut, wider than tall with horizontal branches, but similar to English walnut. Nuts are sweeter, but smaller and harder to remove than English walnuts. Prefers alkaline soil. Fire-resistant. Easy and fast to grow. Self-fertile. Disease-resistant. Casts heavy shade. Flowers May- June, ripens Oct.




Hickory- 60- 120 ft tall and 40 ft wide trees of two North American species, shellbark (*Carya laciniosa*) and shagbark (*C. ovata*), that produce flavorful nuts (13% protein, 64% fat, and high in thiamin, Cu, Mg, Zn, Mn) with thick shells. Also produce hard wood. Prefer full sun. Shellbarks can tolerate seasonal flooding and poor drainage, while shagbarks will grow in heavy clay soil, are wind-tolerant, and can be coppiced. Thinner-shelled and larger nut varieties available. Fall color. Need two for pollination. Resistant to oak root fungus. Cast heavy shade. Shellbarks flower April- May, ripen Sept- Oct. Shagbarks flower June, ripen Oct- Nov. Propagated from stratified seed.




Italian Stone Pine (*Pinus pinea*)- 30- 70 ft tall and 30- 60 ft wide, umbrella-shaped tree produces sweet pine nuts (14% protein, 68% fat) in a 5 inch cone. Cones open when left in direct sunlight. Nuts high in Cu, Fe, K, Mg, Mn, Zn, B vitamins, vit E and K. Sun-lover. Needs well-drained soil. Tolerant of heat, drought, and wind. Flammable. Easy to grow. Need two for nuts. Zone 9 only. Susceptible to oak root fungus, otherwise disease and deer-resistant. Allelopathic. Flowers May- June, ripens April. Propagated by seed (yields in ten years).




Monkeypuzzle (*Araucaria araucana*)- up to 100 ft tall and 30 ft wide, ornamental tree produces large cones of 250, 2 inch long "pine" nuts that taste like corn or chestnuts after roasting (similar to bunya bunya). Grows slowly and takes many years before producing nuts (20- 30 years from seed). Cones are shed when ripe. Prefers well-drained soil. Dislikes hot, dry soil. Salt-tolerant. Both sexes needed for pollination. Susceptible to oak root fungus. Deer-resistant. Casts light shade. Flowers June- July, ripens Sept- Oct. Propagated by seed, cuttings, and basal shoots.




Northern Pecan (*Carya illinoensis*)- 70- 90 ft tall and 30- 40 ft wide North American tree grown for its delicious nut (10% protein, 88% fat, high in Cu, Zn, Mn). Smaller nuts than southern varieties. Needs two for best pollination and a warm microclimate. Prefers full sun and moist, well-drained soil of wide pH. May only yield during especially hot Summers in cooler areas. Pollination inhibited by high humidity. Easy to grow. Disease-resistant (including oak root fungus). Casts heavy shade. Flowers April- May, ripens Oct. Propagated from stratified seed, softwood cuttings, layering, root suckers.




Pistachio (*Pistacia vera*)- 20- 30 ft x 25 ft tree produces yummy nuts (20% protein, 20% fat, and high in B vitamins, Cu, Fe, K, Mg, and Mn). Needs full sun, well-drained soil, and hot Summers. Drought-tolerant. Dislikes high humidity. Hardy to 10°F. Tolerates high pH and poor soil. Yields are less consistent outside of the Sacramento Valley. Both sexes needed for nuts. Leaves turn bright yellow in Fall. Easy to grow. Susceptible to oak root fungus, otherwise disease and deer-resistant. Flowers April, ripens Oct. Propagated by soaked seed, softwood cuttings, layering.



Trazel (*Corylus* X *colurnoides*)- 20- 35 ft by 15 ft cross of European filbert (*C. avellana*) and Turkish tree hazel (*C. colurna*) growing in a typical tree form and producing good nuts (13% protein, 61% fat, high in Ca). Tolerates wind, partial shade, drought, and basic soil. Must have two for pollination. Flowers April- May, ripens Sept- Oct. Propagated by layering.




Valley Oak (*Quercus lobata*)- 80- 120 ft tall by up to 150 ft wide Californian oak is one of the world's biggest, with the largest (around 1- 2 inches long) and sweetest of the West Coast's acorns (5% protein, 5% fat, and high in vit C and A). Acorns still need to be leached of tannic acid (it's easiest to leave the ground pulp in running water, such as in the tank of a flush toilet, or in a stream, but three washes of warm water will also work) or cooked with ash, and can be dried and stored for years. Unlike some native oaks, it bears every other year, rather than every three or more, but trees take 25 years to produce. Acorn oil is reportedly as good as olive oil (and would be great as a fuel, as well as for eating). Partially self-fertile. Tolerates wind, drought, and heavy, wet Winter soils. Develops a weeping habit. Somewhat resistant to oak root fungus. This monster tree casts moderate shade and can probably tolerate irrigation better than other native oaks as it prefers bottomlands and other areas with good soil moisture (avoid irrigating around the base of the trunk, to be safe), making it an ideal overstory species. Oregon white oak (*Q. garryana*) also has relatively sweet acorns and there are many exotic oaks with sweet acorns, such as bur oak (*Q. macrocarpa*) and cork oak (*Q. suber*). Out of native species, coast live oak (*Q. agrifolia*) and black oak (*Q. kelloggii*) acorns have the moist oil (around 17%). Flowers March- April, ripens Sept- Nov. Propagated by seed.

Tall Fruit Trees




American Persimmon (*Diospyros virginiana*)- this 30- 50 ft tall by 24 ft wide tree (though it can be maintained at 15 ft) is round-crowned with sweet 1- 2 inch fruit that is high in Fe and vit C (must be totally soft before eaten). Partial shade, wet, heavy soil, and drought-tolerant. Fruits may need to be ripened off the tree in areas with cool Summers. Most varieties need both sexes for fruit. Beautiful Fall foliage. Easy to grow. Casts heavy shade. No pest (including deer) or disease problems (including oak root fungus). Does well under English walnut. Flowers May- June, ripens Sept- Nov. Propagated from stratified seed, cuttings.




Apple (*Malus pumila* or *domestica*)- standard trees are 30 ft tall and wide, with genetic dwarfs and dwarfing rootstocks that create a tree as small as 5 ft (mini-dwarf). Apples have more varieties than any other domesticated fruit, resulting in a wide range of flavors, textures, colors, possible environments, and ripening periods. Some varieties (especially cooking apples) tolerate heavy clay soil and partial shade and have fruits that may be stored until May. Dislike high temperatures (MM11 rootstock and central leader structure help). Somewhat fire-resistant. Fall color (some). Disease-resistant varieties are preferable. Somewhat resistant to oak root fungus. Growing *Allium*s underneath can prevent scab. Flowers March- April. Propagated by hardwood cuttings (some), layering, and root suckers.




Asian Pear (*Pyrus* sp.)- a beautiful, compact, columnar tree with rootstocks for 5- 40 ft tall trees. Standards reach 20 ft wide. Fruit ripens on the tree and can keep until March. Tolerates drought, partial shade, late frost, and heavy, wet soils. Somewhat fire-resistant. Most need two varieties for pollination. Fall color. Flowers March- April, ripens July- Nov.




Avocado (*Persea* spp.)- up to 80 ft tall (usually 20- 40 ft by 20 ft) with dwarfs available. Fruits are 7- 26% fat (second only to olive) and high in Cu, Mg, K, Mn, B vitamins, and vit A, C, E, and K. Produces only in full sun, with grafted trees fruiting in 1- 2 years compared to 8- 20. Best when cross-pollinated with differently-timed varieties ('Mexicola' is self-fertile as well as hardy). Two or three can be planted in one hole. Need good drainage (they don't like clay) and wind protection. Produce better with monthly watering, especially during flowering. Treat like citrus. Hardiest varieties freeze around 17°F. Fire-resistant. Resistant to oak root fungus. Dominate soil through shade and slowly-decaying leaves. Numerous varieties which, altogether, flower and fruit throughout the year. Propagated by seed (though not true), softwood cuttings.




Cherry (*Prunus* spp.)- rootstocks and genetic dwarfs result in trees 6- 40 ft tall. Standards reach 35 ft wide. Fruit is high in Cu, K, Mn, and vit A and C. Prefer full sun. Sweet cherries cannot tolerate wet or heavy clay soil and need another pollinating variety ('Stella' is self-fertile). Sour cherries are self-fertile, tolerant of poor drainage, partial shade, and drought, and can be hedged. There are also bush (4 ft tall) sour cherries available that fruit in September (Zone 8 only). Somewhat fire-resistant.

Fall color. Susceptible to oak root fungus. Flowers March- April. Sweet cherries ripen May- July. Sour cherries ripen June- Aug. Propagated by layering (sweet) and root suckers.





Chilean Wine Palm (*Jubaea chilensis*)- this 36- 80 ft by 15-25 ft tree is hardy to 5- 20°F and produces a 2 inch sweet fruit with a 1 inch coconut inside. Drought and wind-tolerant and sun-loving. Slow-growing and slow to yield (may take up to 60 years to produce seed). Deer-resistant. Casts light shade. Flowers March, ripens Sept- Oct. Propagated by soaked, shelled seed.




European Pear (*Pyrus communis*)- most rootstocks produce trees 5- 20 ft tall with a vertical growth habit, though standards can reach 60 ft by 30 ft. Many varieties. Fruit high in Cu, K, and vit C. Tolerate wet and heavy clay soil (especially on quince rootstock) and partial shade. Need another variety for pollination. Pick fruit while still green and firm. Some can be stored until May. Some have pretty Fall foliage. Disease-resistant varieties best. Pear roots are resistant to oak root fungus. Flowers March- April, ripens July- Oct. Propagated by layering, root suckers.



Fig (*Ficus carica*)- trees grow up to 35 ft tall and 50 ft wide, but can be hedged or espaliered and there are small varieties. Some varieties give two crops a year. Fruit is high in K, Mg, Mn, thiamin, and vit B6 and K. Does well in most soils and needs little fertilizer. Drought-tolerant. Can tolerate shade in warm areas, but needs full sun for best fruit and does best on a south-facing wall. Trees in Zone 8 may get frozen back to roots some Winters, but will resprout. Deep mulching may be required in frost pockets. Fast and easy to grow. Spreads by suckers. Yellow in Fall. No pest (including deer) or disease problems (including oak root fungus), except for gophers, which love figs. Cast heavy shade. Flowers June- Sept, ripens June- July and Aug- Nov. Propagated from cuttings (yields in three years), layering.




Guadalupe Palm (*Brahea edulis*)- this 30ft by 15 ft tree is hardy to 18°F and produces a 1 inch, black, fibrous, date-like fruit with a thin flesh. Drought, wind, and salt-tolerant and sun-loving. Tolerates basic soil. Fruit may not ripen in cool areas. Deer-resistant. Casts light shade. Flowers Feb- July, ripens July- Aug. Propagated by soaked seed.




Japanese Raisin Tree (*Hovenia dulcis*)- this 15-25 ft tall and 18 ft wide, dome-shaped tree has 1 inch, pear-flavored ‘fruits’ that dry

into a raisin-like food. The part that is eaten is the stem-like receptacle behind the real fruit. Tolerates partial shade and most soils. No pests or diseases. Casts heavy shade. Flowers July- Oct, ripens Oct. Propagated by seed, cuttings.




Loquat (*Eriobotrya japonica*)- seedlings can reach 20- 30 ft by 15 ft, but most grafted varieties only reach 10 ft. Evergreen. Produce 1- 2 inch, orange/pear-flavored fruit from February to June high in K, Mg, Mn, folate, and vit A and B6. Fragrant flowers. Wind, drought, and partial shade-tolerant. Don't like alkaline soil. Tolerate 14- 20°F, but flowers are killed at 26°F. Only some varieties are partially self-fertile. Easy to grow. Can be made into a hedge. Cast heavy shade. Flower Oct- March. Propagated by seed, cuttings, layering.




Mayhaw (*Crataegus opaca*)- 15- 27 ft by 18 ft tree produces ¾ inch fruits popular for jelly. Tolerates drought, wind, partial shade, wide pH, and heavy, wet soil. Easy to grow. Resistant to oak root fungus. Flowers March- April, ripens May- June. Propagated by seed, but difficult.




Mulberry (*Morus* spp.)- most varieties can reach 30- 65 ft tall (contorted and weeping forms are short) and wide but are easily kept much smaller, with blackberry-like fruits ranging from ¾ - 3 inches long that ripen over a long period. Fruits are high in Ca, Cu, Fe, K, Mg, B vitamins, and vit C, E, and K. Wet, heat, and drought-tolerant, wind-resistant, and need little fertilizer. The Persian mulberry (*M. nigra*) fruits well even in 70% shade. Fast and easy to grow. Yellow in Fall. Most are self-fertile. Fruit will stain. Good for living fences or growing grapes into. Disease-resistant (including oak root fungus). Cast heavy shade. Protect small plants from mollusks. Flower April- June, ripen May- Sept. Propagated from cuttings, layering.



Olive (*Olea europa*)- 25- 30 ft tall and 20- 30 ft wide evergreen tree with many varieties. Needs full sun and a long Summer to mature fruit, but can be grown as an understory in hot climates. Fruit is 15- 31% fat, high in Cu, Fe, and vit A and D. Fruits stored under salty water are edible in about 6 weeks. Hardy to 13°F. Needs good drainage. Salt-tolerant. Extremely drought-tolerant. Fire-resistant. Most are self-fertile, though production is better with multiple varieties and high humidity inhibits pollination. Easy to grow. Strawberries sometimes carry an olive disease, otherwise disease and deer-resistant. Insectary. Flowers March- May, ripens Sept- Jan. Propagated from seed, cuttings, root suckers.



Service Tree (*Sorbus domestica*)- this shade-tolerant 30- 35 ft tall and wide tree produces apple or pear-shaped, medium-sized fruits high in vit C that taste like applesauce when soft. Likes clay soil. Wind-tolerant. Fire-resistant. Flowers May, ripens Sept- Oct. Propagated from seed, cuttings.

Strawberry Tree- 'Marina' reaches 20- 30 ft tall and wide and has superior fruits (but is only for Zone 9). See listing under Short Fruit Trees.




White Sapote (*Casimiroa edulis*)- evergreen tree reaches about 30 ft tall and wide and produces a 3 inch custardy fruit with a vanilla/pear flavor high in K, Mg, niacin, and vit A and C. Takes 19- 22°F, but does best above 24°F. Needs fertilizer and sun. Fire-resistant. Easy to grow. Disease-resistant. Casts heavy shade. Altogether, the several varieties flower and fruit year-round. Propagated from seed

Short Nut Trees

Almond- 'Reliable' reaches 12- 20 ft, produces lots of strong-flavored almonds, and is self-fertile and disease-resistant. 'Halls Hardy' semi-dwarfs reach 20 ft. See listing under Tall Nut Trees.




California Hazelnut (*Corylus cornuta*)- native, multi-trunked tree reaching 12- 18 ft tall and wide and producing small, thick-shelled hazelnuts (13% protein, 61% fat, high in Ca, Cu, Mg, Mn, B vitamins, and vit E). May be pruned to a typical tree form with one trunk, or may be kept as a hedge. Can be quite productive in the shade. Tolerant of heavy, wet, alkaline soil, late frost, wind, and drought. Fall color. Immune to Eastern Filbert Blight and other diseases, but larvae typically eat half of the nuts and squirrels will eat the rest if not harvested early. Casts heavy shade. Flowers February- May, ripens Aug- Oct. Propagated by seed, division, layering.

Chestnut- an 8ft dwarf Korean chestnut (*C. crenata*) is available. See listing under Tall Nut Trees.

English or Persian Walnut- dwarfs of 12- 18 ft are available. See listing under Tall Nut Trees.




Filbert (*Corylus* spp.)- 10- 15 ft tall and wide multi-stemmed tree grown for its nuts, which are 13% protein, 61% fat, high in Ca, Cu, Mg, Mn, B vitamins, and vit E. Nuts store for over a year. Very productive and easy to grow. Can take partial shade, late frost, wind, wet soil, and a wide pH. Does not like intense Summer heat. Forms an excellent hedge when planted at 4 ft intervals. Fruits on last year's new wood. Must have appropriate pollinating varieties as companions. Fall color. Blight-resistant varieties preferable (especially in north). Must harvest nuts early to beat squirrels. Casts heavy shade. Flowers Jan- April, ripens Sept- Oct. Propagated by seed, division, layering.




Macadamia (*Macadamia* spp.)- slow-growing, spreading evergreen tree up to 21 ft tall. Yields nuts over several months which are 8% protein, 76% fat and high in Cu, Fe, Mg, Mn, and B vitamins. Prefers warm, sheltered site with moist but well-drained soil. Needs lots of water at first, but eventually drought-tolerant. Slow to bear in cool climates. Survives 20- 24°F. Fire-resistant. Self-fertile. Harvest nuts when hulls split. Nuts are difficult to crack. Resistant to deer and oak root fungus. Flowers Febr- April, ripens Aug- Nov. Propagated by seed, softwood cuttings, and air layering.



Pinyon Pine (*Pinus edulis* and *P. monophylla*)- 10- 20 ft tall and 8- 16 ft wide North American native, slow-growing trees famous for their nuts (15% protein, 61% fat, and high in thiamin, Mg, Cu, Mn). Mature trees have a beautiful, spreading appearance. Need full sun and well-drained soil. Prefer acidic soil. Flammable. Easy to grow. Need two for nuts. Susceptible to oak

root fungus, otherwise disease and deer-resistant. Allelopathic. Cast light shade. Single-leaf pinyon (*P. monophylla*) is native to eastern Oregon and California. Ripen Oct. Propagated by seed (takes 25 years to yield).



Siberian Pea Tree (*Caragana arborescens*)- 15 ft tall and 8- 12 ft wide hardy tree produces lentil-like legumes (up to 36% protein and 12% fat) in pods (which can also be eaten when young). Fixes nitrogen. Needs a sunny, open site and well-drained soil. Wind, salt, high pH, late frost, and drought-tolerant. Has weak thorns. Spreads by suckers, though it grows very slowly in our region. Good hedge. Insect and disease-free (including oak root fungus), though mollusks can destroy plants even 2 ft tall in moist areas. Casts light shade. Flowers April- May, ripens Sept. Propagated by seed, cuttings, layering.



Yellowhorn (*Xanthoceras sorbifolia*)- 15- 25 ft tall by 10- 15 ft wide attractive tree produces pea-sized, macadamia-like nuts in 2 inch seed capsules. Leaves and flowers also edible. Tolerates partial shade. Easy to grow, even in sand and alkaline soil. Experimental in warmer parts of Zone 9. Casts light shade. Flowers May, ripens Sept. Propagated by seed, cuttings.

Short Fruit Trees

Apple- semi-dwarfs are 15- 20 ft tall. See listing under Tall Fruit Trees.




Apricot (*Prunus armeniaca*)- beautiful 12- 25 ft tall and wide tree produces lots of fruit. Semi-dwarfs, dwarfs, and 'GoldenGlo' genetic dwarf available. Fruits are high in Cu, K, Mg, Mn, B vitamins, and vit A, C, E, and K. Prefers well-drained soil, full sun, warm microclimate, and good air circulation. Flowers susceptible to late frosts. Tolerates high pH. Somewhat fire-resistant. Fruits better with pruning and cross-pollination. Fall color. Prune in Summer to avoid disease, removing 25% of oldest wood annually. Susceptible to oak root fungus. Disease-resistant, late-blooming varieties (such as 'Puget Gold') preferable. Flowers Febr- April, ripens May- Sept. Propagated from cuttings (difficult).

Asian Pear- semi-dwarfs are 15- 20 ft tall. See listing under Tall Fruit Trees.



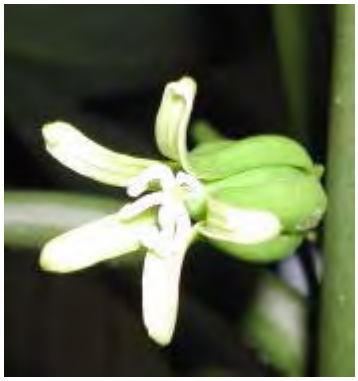

Asian Persimmon (*Diospyros kaki*)- this 15- 30 ft tall and wide tree produces sweet fruit that is high in Mn and vit A and C. There are both astringent (must be totally soft to eat) and non-astringent varieties. Will fruit in semi-shade and often produces more and better fruit with two trees. Wet and drought-tolerant rootstocks available. Tolerates heavy soil. 'Izu' is an early-ripening nonastringent variety best for higher elevations in Oregon, or for areas further north. Easy to grow. Beautiful Fall foliage. Does well under English walnut. No pest or disease problems (including oak root fungus). Casts heavy shade. Flowers May- Aug, ripens Oct- Jan. Propagated from cuttings.

Avocado- 'Littlecado' or 'Wertz' is only 8- 10 ft tall. See listing under Tall Fruit Trees.



Azarole (*Crataegus azarolus*)- out of the hundreds of species of hawthorns, this 10- 30 ft tree or hedge has one of the most popular fruit, with the 1 inch fruits tasting like a tart apple. High in vit C. Tolerates partial shade, wind, wet heavy clay soil, high pH, and drought. Easy to grow. Resistant to oak root fungus. Flowers June, ripens Sept- Oct. Propagated from seed.






Babaco Papaya (*Carica pentandra* or *C.* X *heilbornii pentagona*)- 5- 15 ft tall and 3- 5 ft wide, self-fertile papaya produces several seedless, foot-long, acidic, juicy fruits a year with a subtle strawberry-pineapple-guava-banana-paw paw flavor. Fruits are high in K and vit C. Tolerates partial shade, but hates wind. Needs a warm microclimate, regular water, and fertilizer. High temperatures and low humidity can result in aborted fruit. Reportedly hardy to 24°F, but recommended only near the (Californian) ocean. Typically lives 4- 8 years. Casts light shade. Flowers May- Sept, ripens May- Dec. Propagated by 12 inch trunk cuttings.




Banana (*Musa* spp.)- 7- 15 ft tall and 4- 9 ft wide herb that produces one of the world's most popular fruits, high in K, Mg, B vitamins, and vit C. There are varieties that have supposedly survived and fruited in Zone 6, but I have only personally witnessed fruiting plants in coastal California. These reportedly die back to the ground every Winter until they store up enough energy to produce fruit. Needs full sun, a warm microclimate, protection from wind, well-drained soil, and lots of water, organic matter, and fertilizer. Prefers acid soil. Ideally suited to a graywater system. Allow only one other stalk to grow after the main stalk has flowered and cut down the main stalk when the fruit have reached full size. Ripen the whole cluster in a bag. Top freezes at 28°F. Plantains are a little hardier. Typically ripen late Summer to Winter. Propagated by division.



Blackhaw (*Viburnum prunifolium*)- ornamental 15- 20 ft tall and 12 ft wide tree producing ½ inch berries which ripen after frost. Red Fall foliage and spreading habit. Pest-free, any soil, sun or shade. Need two varieties for fruit. Flowers June, ripens Aug- Dec. Propagated by seed, cuttings, division, layering.




Carob (*Ceratonia siliqua*)- 20- 40 ft tall by 25- 50 ft wide tree that produces seeds (60% protein) and a sweet gum inside its seed pods used as a nutritious chocolate substitute (10% protein and high in Ca, Cu, Fe, K, Mg, Mn, and B vitamins). Ripe pods can be eaten fresh and are date-like. Harmed at 25°F and killed at 18°F. Wind, high pH, heat, and drought-tolerant. Likes well-drained soil. Easy to grow. Self-fertile varieties available, otherwise both sexes required. Pods can get worms and mold if there is much rain in October and November, otherwise pest (including deer) and disease-resistant (including oak root fungus). Casts heavy shade. Flowers Aug- Oct, ripens Sept- Nov. Propagated from soaked seed in Spring, layering.

Chamburro Papaya (*Carica stipulate* or *pilhescens*)- 15 ft tall by 5 ft wide papaya that can also be kept at 5- 6 ft. Seed cavity of the fruit is filled with a creamy white pulp, which is the best part to eat, while the rest is more melon-like and must be cooked. Fruit high in K and vit C. Tolerates 25°F. Casts light shade.




Che or Mandarin Melonberry (*Cudrania tricuspidata*)- tree growing up to 25 ft but usually kept as a suckering bush, producing lots of succulent, watermelon-flavored 1- 2 inch fruits in November. Needs a warm and sunny location. Inadequate irrigation can result in the abortion of fruit. Yellow in Fall. Both sexes required for fruit, although a seedless, self-fertile variety is available. Flowers June, ripens Nov. Propagated from softwood cuttings.

Cherry- genetic dwarfs are 6 ft, while bush cherries are 4 ft. See listing under Tall Fruit Trees.




Chinese Dogwood (*Cornus kousa*)- ornamental 12- 25 ft tall and wide tree that produces 1 inch, custardy fruits. Leaves are edible cooked. Tolerates partial shade, late frost, and heavy clay soil. Doesn't like dry soil. Leaves turn scarlet in Fall. Can be made into a 6- 8 ft hedge. Disease-resistant (including oak root fungus). Flowers June, ripens Sept. Propagated by seed, cuttings, layering.




Chinese Haw (*Crataegus pinnatifida major*)-15- 20 ft tall and wide tree bearing 1 ½ inch, tart red fruit in October. Prized candied in China. Tolerates partial shade, wind, drought, and very alkaline, wet, heavy clay soil. Easy to grow. Red Fall foliage.

Resistant to oak root fungus. Flowers April- June, ripens October. Propagated by seed (difficult).




Cornelian Cherry Dogwood (*Cornus mas*)- ornamental12- 20 ft tall and wide tree can also be kept as an 8- 10 ft hedge and produces a heavy crop of sour, ¾- 1 ½ inch, plum/cranberry-flavored fruit high in vit C. Productive even in 85% shade. Easily grown in most soil (tolerates heavy clay and high pH). Wind-tolerant. Two needed for a good crop. Bright Fall foliage. Resistant to oak root fungus. Flowers Febr- March, ripens Sept. Propagated from seed, cuttings, layering.




Crabapple (*Malus* spp.)- size varies with rootstock and variety, but is typically 8- 12 ft tall and wide, with mini-dwarfs available, as well. Many varieties and different flavors of fruit (usually tart), 1- 2 inches, which are high in K, Mn, and vit C. Tolerate wet soils. Somewhat fire-resistant. Somewhat resistant to oak root fungus, otherwise disease-resistant. Good pollinator for apples. Flower March- April, ripen July- Dec. Propagated by hardwood cuttings, layering, root suckers.




Elderberry (*Sambucas* spp.)- cultivars range from 6- 30 ft tall by 6- 20 ft wide and produce clusters of tiny, sweet berries. Some say the native blue elderberry (*S. mexicana*) tastes best, but it is variable. Fruit is high in Ca, Cu, Fe, K, and B vitamins, and very high in vit A and C. Tolerate partial shade, late frost, salt, high pH, and wet, heavy clay. Spreads by suckers. Easy to grow.

Some need pollinators. Disease-resistant (including oak root fungus). Slightly allelopathic. Cast light shade. Flower April- July, ripen July- Sept. Propagated from cuttings, division.

European Pear- semi-dwarfs are 15- 20 ft tall. See listing under Tall Fruit Trees.

Fig- see listing under Tall Fruit Trees.


Hardy Citrus - typically under 6 ft (though some grow to 15 ft or more), there are lemon, grapefruit, mandarin, and orange varieties that can grow in areas too cold for conventional citrus. Need well-drained soil, lots of sun, and a warm microclimate. Established trees usually need Summer watering every 2- 3 weeks. Some have thorns. Fire and deer-resistant. Protect small plants from ants.




Hawthorn (*Crataegus* spp.)- 18 ft tall and 15 ft wide, *C. schraderiana* is one of the best hawthorns, producing an incredibly tasty 2 inch fruit in September. *C. arnoldiana*, *C. missourienis*, and *C. pensylvanica* should also be tried. Very easy to grow and tolerant of most conditions. Many have thorns and some spread by suckers. Good hedge. Disease-resistant (including oak root fungus). Some species can be invasive. Flowers June, ripens Sept- Oct. Propagated by seed.




'Improved Meyer' Lemon (*Citrus* sp.)- a genetic semi-dwarf, this lemon grows to about 15 ft tall and wide, but can be kept smaller. Fruits very high in vit C, and also high in B vitamins, Ca, Cu, Fe, K, Mg, and Mn. Ripens year-round. Reliable even in cool areas, it can take 18°F. Other lemons and 'Bearss' lime may be grown in the warmest parts of California. Need lots of nitrogen during the growing season. Prefer acid soil. Established trees usually need Summer watering every 2- 3 weeks. Has some thorns. Fire and deer-resistant. Casts heavy shade. Protect small plants from ants. Propagated by seed, cuttings.



Jelly or Pindo Palm (*Butia capitata*)- this 15 ft tall by 12 ft wide palm produces 1 inch, fibrous, apricot/banana/pineapple-flavor fruit. Some report the seed to be edible, as well. Takes 10- 15°F, tolerates some shade, and is wind and drought-tolerant. Deer-resistant. Flowers July- Aug, ripens April- May. Propagated by seed.




Jujube or Chinese Date (*Zizyphus jujuba*)- 20 ft tall by 15 ft wide tree that produces 1 ½ inch fruit that look and taste like very sweet apples. They are better dried (tasting like dates) and are high in K, Mn, and B vitamins, and very high in vit C. Tolerates heavy clay, high pH, salt, and drought. Prefers well-drained soil. Needs hot Summers to ripen well. Li variety is self-fertile.

Easy to grow. Fall color. Disease- resistant. Casts light shade. Flowers April- June, ripens Aug- Oct. Propagated by seed, cuttings, division.

Loquat- grafted trees typically reach 10 ft. See listing under Tall Fruit Trees.




Medlar (*Mespilus germanica*)- 10- 18 ft tall and wider tree that produces 1 inch cinnamon/applesauce-flavored fruit. Fruit must be picked and allowed to ripen for a few weeks until totally soft. Tolerates partial shade, late frost, and wind. Fall color. Self-fertile. Disease-resistant. Flowers May- June, ripens Nov. Propagated by cuttings, layering.




'Moro' Blood Orange (*Citrus sinensis*)- on dwarfing rootstock, this tree gets up to 12 ft tall and wide, but can be kept much smaller. Produces red-fleshed, medium-sized, sweet fruit with a raspberry aftertaste, high in Ca, Cu, K, Mg, B vitamins, vit A, and very high in vit C. Takes 23°F. Other oranges (and grapefruit) may be grown in the warmest areas of California, such as 'Washington Navel,' 'Valencia,' 'Skaggs Bonanza,' and 'Trovita.' Fruit will not get sweet in cool areas. Needs lots of nitrogen during the growing season. Prefers acid soil. Established trees usually need Summer watering every 2- 3 weeks. Fire and deer-resistant. Casts heavy shade. Protect small plants from ants. Flowers April, ripens Febr- May. Propagated by softwood cuttings.


Mountain Ash (*Sorbus* spp.)- 15- 20 ft tall by 10- 15 ft wide ornamental tree with cultivars that produce clusters of tasty berries high

in vit A, C, and niacin. Likes well-drained soil. Tolerates partial shade, high pH, wet soil, and wind. There are several hybrids with other fruits that are worth trying, including 'Shipova,' a pear hybrid. Fire-resistant. Good crops require two varieties. Red Fall foliage. Pest and disease-free. Casts light shade. Flowers May, ripens Sept- Oct.

Mulberry- there is a contorted mulberry that only grows to 6 ft and weeping mulberries can be staked to whatever height desired. See listing under Tall Fruit Trees.



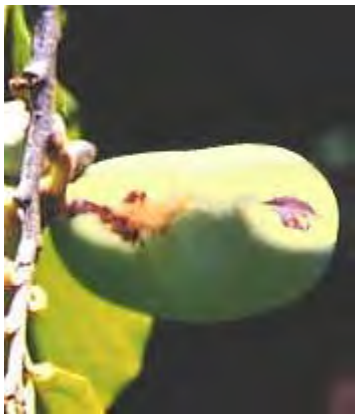

Nectarine (*Prunus persica*)- 12- 16 ft tall and wide tree with genetic dwarfs (prettier) at 3- 5 ft. Fruits high in Cu, K, Mn, B vitamins, and vit A, C, E, and K. Needs lots of sun and well-drained soil. Does best against a south-facing wall. Susceptible to late frosts. Prune out old wood. Fruits must be heavily thinned. Lives 8- 20 years. Somewhat fire-resistant. Beautiful Fall foliage. Self-fertile. Susceptible to oak root fungus. Disease-resistant varieties preferable ('Kreibich' is leaf-curl resistant). Flowers March- April, ripens May- Sept. Propagated by softwood cuttings, layering.

Olive- see listing under Tall Fruit Trees.




'Owari' Satsuma Mandarin (*Citrus reticulata*)- on dwarfing rootstock, this tree gets up to 12 ft tall and wide, but can be kept much smaller. Produces small, sweet mandarin oranges high in Ca, K, Mg, B vitamins, and vit A and C. Weeping habit. Takes 18- 22°F. Other varieties may be grown in the warmest areas of California. Needs lots of nitrogen during the growing season. Prefers acid soil. Established trees usually need Summer watering every 2- 3 weeks. Fire and deer-resistant. Casts heavy shade. Protect small plants from ants. Flowers April- July, ripens Dec- March. Propagated by softwood cuttings.



Paw Paw (*Asimina triloba*)- pyramid-shaped, native North American tree with cultivated varieties growing 10-15 ft tall and 8- 12 ft wide. Creates amazing 3- 5 inch custardy fruit with a banana/mango/guava flavor which is high in protein, fat, vit C, riboflavin, niacin, Ca, Cu, Fe, K, Mg, Mn, and Zn. Edible leaves. Shade-tolerant. Slow-growing. Needs shade and lots of water for the first couple of years, but needs heat to ripen fruit in coastal areas. Prefers well-drained soil and lots of organic matter, but tolerates clay. Space 8 ft apart. Does not like bare-root transplanting. Easy to grow once established. Spreads by suckers. Bright Fall foliage. Most need two for pollination. Pest and disease-free, but protect from mollusks when young. Does well under English walnut. Flowers April- June, ripens Sept- Oct. Propagated from stratified seed, softwood cuttings, and layering.




Peach (*Prunus persica*)- 12- 16 ft tall and wide tree with genetic dwarfs (prettier) at 3- 5 ft. Fruits high in Cu, K, Mg, Mn, B vitamins, and vit A, C, E, and K. Need lots of sun and well-drained soil. Does best against a south-facing wall. Susceptible to late frosts. Prune out old wood. Fruits must be thinned. Live 8- 20 years. Fire-resistant. Beautiful Fall foliage. Self-fertile. Susceptible to oak root fungus. Leaf-curl-resistant varieties essential (or cover from mid-December to February). Underplanting with onions or garlic reportedly helps with leaf-curl. Flowers March- April, ripens May- Oct. Propagated by seed (though not true), softwood cuttings (some), and are easy to bud graft.




Plum (*Prunus* spp.)- a diverse group composed of many species and varieties. While many wild plums reach 30 ft, most grafted trees are on semi-dwarfing rootstocks and only get 12- 15 ft tall and wide. They can be kept smaller, through pruning or dwarfing rootstocks. Fruits high in Cu, K, Mn, and vit A, C, and K. Flavors and ripening times vary wildly. European plums can grow on heavy soils, are wind and drought-tolerant, and don't need pruning or fruit-thinning when mature. Somewhat fire-

resistant. Many are self-fertile. Some have beautiful Fall foliage. Susceptible to oak root fungus (except for Japanese plums). Grow well with black currant. Flower Febr- April, ripen May- Oct. Propagated from hardwood cuttings (some), layering, root suckers.




Pomegranate (*Punica granatum*)- 8- 20 ft tall by 10- 20 ft wide shrub or small tree. Fruit high in Fe, K, antioxidants, B vitamins, and vit C. Needs long, hot Summers to fruit, so may not fruit in north, much less get sweet. Tolerates wet, heavy soil of wide pH, and drought. Likes a warm microclimate. Best against a south-facing wall. Takes at least 18°F ('Wonderful' takes 12°F and will resprout from roots if frozen back). 'Eversweet' produces sweet, nearly seedless fruit, even in cooler or northern areas. 'Dwarf' grows only 2- 3 ft tall. Fire-resistant. Easy to grow. Bright yellow foliage in Fall. Self-fertile. Disease-resistant (including oak root fungus). Flowers May- Sept, ripens Sept- Nov. Propagated by cuttings, division, layering.




Quince (*Cydonia oblonga*)- ornamental 15- 20 ft tall and wide tree that can be maintained at 10 ft. Now used mostly as rootstock, the tart fruit is used in cooking, jelly (high in pectin, vit C, and Cu, Fe, K), and cider. However, the pineapple-flavored 'Aromatnaya' variety is sweet enough to eat fresh. Needs full sun. Tolerates somewhat poor drainage, drought, and late frost. Doesn't like wind. Self-fertile. Easy to grow. Disease-resistant. Flowers March- May, ripens Sept- Nov. Propagated from division, hardwood cuttings, and layering.




Strawberry Tree (*Arbutus unedo*)- beautiful 15 ft tall by 22 ft wide evergreen tree related to madrone (*A. menziesii*), produces ¾ inch, somewhat bland, apricot-flavored fruit over a long period. Fruit is better after drying. Tolerant of wind, drought, partial shade, and most soils, including heavy clay. 'Marina' produces larger, tastier fruit and may reach 20- 30 ft, but is only for Zone 9. Fire-resistant. Makes an excellent hedge (easily kept small and 'Elfin King' is a dwarf that flowers and fruits nearly all year). Easy to grow. Susceptible to oak root fungus, otherwise deer and disease-resistant. Casts heavy shade. Flowers July- Dec, ripens April- Dec. Propagated by seed, basal cuttings, layering.

Nut Hedges

California Hazelnut- see listing under Short Nut Trees.

Filbert- see listing under Short Nut Trees.

Siberian Pea Tree- see listing under Short Nut Trees.

Fruiting Shrubs and Hedges

Apple- mini-dwarfs are 5 ft. See listing under Tall Fruit Trees.

Apricot- dwarfs and 'GoldenGlo' genetic dwarf reach 4 ft. See listing under Short Fruit Trees.

Asian Pear- mini-dwarfs are 5 ft. See listing under Short Fruit Trees.




Autumn Olive (*Elaeagnus umbellata*)- nitrogen-fixing, fast-growing, 10- 15 ft tall and 8 ft wide shrub that produces abundant ¼ inch, cherry-flavored berries in the Fall, even in half shade. Rich in vit A, C, E, and essential fatty acids. Salt and drought-tolerant. Likes well-drained soil. Has thorns. Probably fire-resistant. Good hedge. No pests or diseases (including oak root fungus). Flowers March- June, ripens Aug- Oct. Propagated from cuttings, layering.

Avocado- dwarf is 8- 10 ft tall. See listing under Tall Fruit Trees.

Azarole- see listing under Short Fruit Trees.




Black Hawthorn (*Crataegus douglasii*)- native tree can reach 25- 40 ft but is best kept as a thorny hedge. Produces lots of small, custardy berries. Wind, partial shade, wet, and drought-tolerant. Has thorns and may spread by suckers. Can be coppiced. Beautiful Fall foliage. Resistant to oak root fungus. Flowers May, ripens Aug. Propagated by seed.




Blackberry (*Rubus* spp.)- many varieties and species, some thornless, some groundcovers, and some that can make a hedge. All produce tons of delicious berries, even in partial shade. Fruit high in antioxidants, Cu, Fe, K, Mg, Zn, B vitamins, and vit A, C, E, and K. Will tolerate poor drainage, frost, high pH, and drought. Fruit on year-old canes which die thereafter. Spreads by suckers. Fire-resistant. Most are self-fertile. Plant 5 ft apart. Susceptible to oak root fungus. To avoid verticillium wilt, do not plant in areas where plants from the nightshade family have grown in the past three years. Flowers April- Sept, ripens July- Oct (coastal areas have shorter season). Easy propagation by softwood cuttings, layering, division.




Blackcap Raspberry (*Rubus leucodermis*)- 3- 6 ft native raspberry with blue canes. Fruit is good when red or black. Leaves make tea high in vit C. Tolerates partial shade. Plant 3 ft apart. Has thorns and spreads by suckers. Fire-resistant. Susceptible to oak root fungus. Casts light shade. Flowers May- June, ripens June- Aug. Propagated by softwood cuttings, layering, division.




Blueberry (*Vaccinium* spp.)- beautiful and productive 4- 7 ft (some 1- 18 ft) shrub. Very nutritional fruit high in antioxidants, K, Mn, folate, and vit A and C. Evergreen varieties available. Does better in sun (except for really hot sites) and with another variety. Needs well-drained (in Summer) and mulched, acidic soil and some irrigation. Tolerates frost. Easy to grow. Use low chill varieties in Zone 9. *V. caespitosum* is a native groundcover that should be tried. Red foliage in Fall. Disease-resistant (including oak root fungus). Flowers March- May, ripens June- Sept. Propagated from cuttings, division.



Blue Banana Bean (*Decaisnea fargesii*)- 10 ft tall and wide deciduous shrub with long, pinnate leaves produces metallic blue seed pod full of white juicy pulp with a sweet, fig/grape/banana flavor. Tolerates heavy clay soil. Likes shade. Doesn't like wind. Vulnerable to late frosts. Casts light shade. Flowers June, ripens Sept- Oct. Propagated from cuttings.

Che or Mandarin Melonberry- see listing under Short Fruit Trees.

Cherry- sour cherries can be hedged. See listing under Tall Fruit Trees.




Chilean Guava (*Ugni molinae* or *Myrtus ugni*)- 3- 7 ft tall and wide, shade-tolerant evergreen shrub with produces lots of small, delicious strawberry/guava-like berries. Tolerates 10- 15°F. Drought and wind-tolerant. Vulnerable to late frosts. Easy to grow. Good hedge. No pest or disease problems (including oak root fungus). Flowers June- July, ripens Aug- Oct. Propagated from softwood cuttings, layering, and soaked seeds in Feb.




Chilean Wintergreen (*Pernettya* or *Gaultheria mucronata*)- 2- 3 ft evergreen, shrub produces sweet, but mildly-flavored berries. Needs moist, well-drained soil. Prefers low pH. Tolerates partial shade. Hardy to 5°F. Spreads by suckers. Plant two

varieties for lots of berries. Resistant to oak root fungus. Flowers April- June, ripens Oct- May. Propagated by softwood cuttings, division, layering.

Chinese Dogwood- see listing under Short Fruit Trees.



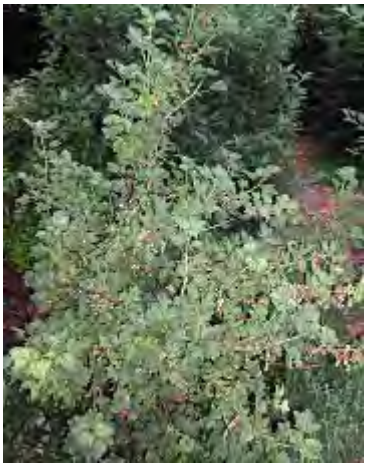

Chocolate Berry (*Leycesteria formosa*)- 6 ft tall evergreen shrub produces small berries said to have a bitter chocolate flavor, though they taste like raisins to me. Grows fast and tolerates partial shade and wind. Tolerates 0°F. Good hedge. Flowers June- Sept, ripens Aug- Nov. Propagated by cuttings.




Chokeberry (*Aronia melanocarpa*)- amazing 5- 6 ft tall and wide ('Nero' only grows 3- 4 ft) popular shrub produces tons of blueberry-sized fruit high in antioxidants, minerals, and vitamins, including vit C. Fruit is better from cultivated varieties, dried, or after a frost. Easy to grow in shade and heavy, wet soil. Tolerant of heat and drought. Red foliage in Fall. Good hedge. Disease-resistant (including oak root fungus). Flowers May- Aug, ripens Aug- Dec. Propagated from softwood cuttings, division, layering.

Cornelian Cherry Dogwood- see listing under Short Fruit Trees.

Crabapple-mini-dwarfs are 5 ft. See listing under Short Fruit Trees.




Currant (*Ribes* spp.)- 3- 5 ft tall shrubs with many varieties and species, including native ones, fruiting in June. Fruit is good in cooking (black currants are very high in vit C and high in almost everything else, while red currants are high in Ca, Cu, Fe, K, Mg, Mn, riboflavin, niacin, and vit C and K). Can be grown in partial shade and tolerate heavy soils with good drainage (black currants tolerate wet soils, as well). May need watering. Fire-resistant. Plant only disease-resistant varieties. Low chill varieties necessary for Zone 9. For greater production, prune out stems older than two years on black currants and older than three on red currants. Susceptible to oak root fungus. Black currants grow well under plums. Protect small plants from mollusks. Flower Febr- April, ripen June- July. Propagated from hardwood cuttings, division, and layering.




Elaeagnus* X *ebbingei- 9- 15 ft, nitrogen-fixing, fast-growing, evergreen hybrid shrub producing delicious and nutritious berries in April. Rich in vit A, C, E, and essential fatty acids. Shade, drought, wind, heavy clay, and salt-tolerant. Needs well-drained soil. Has thorns. Probably fire-resistant. Good hedge. Pest (including deer) and disease free (including oak root fungus). Increases yield of fruit trees by 10%. Flowers Oct- Jan, ripens April- May. Propagated by cuttings, layering.

Elderberry- see listing under Short Fruit Trees.

European Pear- mini-dwarfs are 5 ft. See listing under Short Fruit Trees.




Evergreen Huckleberry (*Vaccinium ovatum*)- native, shade-tolerant, evergreen, 6 ft shrub that produces small, blueberry-like fruit high in antioxidants and vit C that ripen over a long period through December. Prefers low pH. Tolerates drought and wet

soils. Spreads by suckers. Reddish Fall foliage. Excellent hedge. Deer-resistant (including oak root fungus). Flowers Febr- May, ripens July- Dec. Propagated by cuttings, layering, division.

Fig- see listing under Tall Fruit Trees.




Flowering Quince (*Chaenomeles speciosa*)- several varieties of ornamental shrubs growing 4- 8 ft tall and producing medium-sized fruits with a pineapple-citrus flavor used for jelly. Need well-drained soil. Tolerate heavy clay and partial shade. Some have thorns. Need two varieties for fruit. Good hedge. Resistant to deer and oak root fungus. Flower Jan- June, ripen Oct- Jan. Propagated by cuttings, layering.




Gooseberry (*Ribes* spp.)- 3- 4 ft shrubs with many varieties and species. Fruit is good in cooking and is high in Ca, Cu, K, Mg, Mn, B vitamins, and vit A and C. Sweet varieties can be eaten fresh. Shade-tolerant, can be placed along a N-facing wall. Tolerate heavy, but not wet soils. May need watering. Have thorns. Fire-resistant. Plant only disease-resistant varieties. Low chill varieties necessary for Zone 9. Good hedge. Susceptible to oak root fungus. Protect small plants from mollusks. Flower Febr- April, ripen June- Aug. Propagated from hardwood cuttings, division, and layering.




Gumi *(Elaeagnus multiflora*)- 6- 10 ft nitrogen-fixing, fast-growing, shade-tolerant shrub producing the best tasting *Elaeagnus* berries. Small cherry-like fruit used medicinally and is rich in vit A, C, E, and essential fatty acids. Drought, wind, heavy clay, and salt-tolerant. Prefers well-drained soil. Most have thorns. Fire-resistant. Good hedge. Pest and disease-resistant (including oak root fungus). Cultivated varieties produce larger fruit earlier in the year. Flowers March- May, ripens June- July. Propagated from cuttings, layering.

Hawthorn- see listing under Short Fruit Trees.




Highbush Cranberry or Guelder Rose (*Viburnum trilobum* or *opulus*) - 10- 15 ft tall and wide shrub or small tree produces bitter, cranberry-like fruit. Tolerates partial shade, drought, high pH and heavy clay soil. Does well in wet soil. Red Fall foliage. Disease-resistant. Flowers June, ripens July- Sept. Propagated by cuttings, layering.




Hollyleaf Cherry (*Prunus ilicifolia*)- 8- 10 ft tall and wide native evergreen shrub produces 1 inch, large-pitted cherry/plums. Fruit skins can be slightly bitter. Tolerates partial shade, high pH, and drought. Fire-resistant. Good hedge. Resistant to deer and oak root fungus. Allelopathic. Excellent insectary. Flowers March- May, ripens Sept- Oct. Propagated by seed.




Honeyberry or Blue Honeysuckle (*Lonicera caerulea* var. *kamtschatica*)- up to 6 ft shade-tolerant shrub produces ½ inch blueberry-like fruit in May. Not for Zone 9. Prefers full shade. Fire-resistant. Need two varieties for fruit. Resistant to oak root fungus. Protect small plants from mollusks. Flowers March, ripens May- June. Propagated from cuttings, layering.

'Improved Meyer' Lemon- see listing under Short Fruit Trees.




Lemon Guava (*Psidium littorale longipes* or *P. cattleianum lucidum*)- 15 ft evergreen shrub that produces sweet, 1- 1 ½ inch lemon guavas with coconut and other tropical flavors superior to its strawberry guava relative. Needs sun and well-drained soil. Takes 20- 23°F. Easy to grow. Good hedge. Deer and disease-resistant (including oak root fungus). Flowers May- Sept, ripens July- Oct. Propagated by seed, cuttings, root suckers, layering.

Loquat- see listing under Tall Fruit Trees.

'Moro Blood' Orange- see listing under Short Fruit Trees.

Mulberry- there is a contorted mulberry that only grows to 6 ft and weeping mulberries can be staked to whatever height desired. See listing under Tall Fruit Trees.




Nanking Cherry (*Prunus tomentosa*)- 6-12 ft ornamental bush produces ½ inch cherries in June. Needs well-drained soil. Tolerates partial shade, high pH, and drought. Needs two for fruit. Easy to grow. Somewhat fire-resistant. Good hedge. Susceptible to oak root fungus, otherwise disease-resistant. Flowers March- April, ripens June- July. Propagated by cuttings, layering, division.

Nectarine- genetic dwarfs are 6 ft x 6- 10 ft, very productive, and have a normal lifespan. Can be maintained at 3 -5 ft. See listing under Short Fruit Trees.




Oregon Grape (*Berberis* or *Mahonia aquifolium*)- 3- 5 ft native evergreen shrub extremely productive of large blue berries with a lemon-like acidity used for cooking. Fruits are sweeter after frost. Full shade, drought, heavy clay, late frost, and heat-tolerant. Root used like goldenseal. There are many other barberries with sweeter fruit worth trying. Has thorny leaves. Spreads by suckers. Fire-resistant. Good hedge. Deer and disease-resistant (including oak root fungus). Casts light shade. Flowers Jan- May, ripens June- Nov. Propagated from leaf cuttings, division.

Oval-leaved Huckleberry (*Vaccinium ovalifolium*)- native, ornamental, 3- 6 ft shrub produces tart blueberry-like fruit. Has red stems. Tolerates partial shade. Prefers well-drained, acidic soil high in organic matter. Dislikes wind. Resistant to oak root fungus. Flowers June, ripens Aug. Propagated by layering and division.

'Owari Satsuma' Mandarin- see listing under Short Fruit Trees.

Peach- genetic dwarfs are 6 ft x 6- 10 ft, very productive, and have a normal lifespan. Can be maintained at 3 -5 ft. See listing under Short Fruit Trees.




Pineapple Guava (*Feijoa sellowiana*)- 6- 8 ft (up to 15- 18 ft) tall and wide evergreen shrub with edible flowers (petals taste like cotton candy) and 2- 4 inch, delicious pineapple guavas in Winter. Fruit is high in Cu, K, Mn, B vitamins, and vit C. Prefers sun, but will fruit in partial shade in the south. Fruit needs heat to ripen well in cool areas. Salt-tolerant. Originally hardy to 5°F, some cultivars only tolerate 12- 18°F. Drought-tolerant, but watering ensures good fruit set. Needs good drainage, but

can take a lot of water. Prefers acid soil. Fire-resistant. Easy to grow. Some varieties are self-fertile. Good hedge. No pest (including deer) or disease problems. Flowers April- July, ripens Oct- Jan. Propagated from seed, softwood cuttings, basal cuttings.

Plum- see listing under Short Fruit Trees.

Pomegranate- 'Dwarf' Pomegranate grows only 2- 3 ft tall. See listing under Short Fruit Trees.



Prickly Pear (*0puntia* spp. and others)- 3- 15 ft tall cacti produce seedy fruits in Fall and edible leaves in Spring. Spines must be thoroughly rubbed or burned off before handling! Leaves are high in Ca, Cu, K, Mg, and vit C. Need full sun. Some species only hardy to 20°F. Need good drainage. Drought-tolerant. There is a spineless variety of Indian fig bred by Luther Burbank (*O. ficus indica tuna*) and an almost seedless variety from Southwest Asia. Fire-retardant. Easy to grow. Disease and deer-resistant. Flowers May- Aug, ripens Sept- Febr. Propagated from leaf pads.



Prinsepia (*Prinsepia sinensis*)- 4- 6 ft tall shrub produces cherry-like fruit and lots of yellow flowers. Tolerant of partial shade, wet, and drought. Spiny branches make a good hedge. Not for Zone 9. Flowers April- May, ripens Aug- Sept. Propagated by softwood cuttings.

Quince- see listing under Short Fruit Trees.




Ramanas Rose (*Rosa rugosa*)- prickly, hardy, 6 ft shrub with 1 inch hips that have a creamy, easily-separated pulp. Richest source of vitamins and minerals of any temperate fruit, being high in essential fatty acids, B vitamins, vit A and K, and super high in

vit C. Edible flowers. Tolerant of partial shade, drought, wind, salt, late frost, and heavy clay soil. Spreads by suckers. Fire-resistant. Easy to grow. Yellow Fall foliage. Good hedge. Deer and disease-resistant (except oak root fungus). Insectary. Flowers May- Aug, ripens Aug- Oct. Propagated from cuttings, division, and layering.




Raspberry (*Rubus idaeus*)- 4- 6 ft canes that can bear over a long period (especially everbearing varieties) and are very productive. Fruit is high in Cu, Fe, K, Mg, Mn, Zn, B vitamins, and vit C, E, and K. Like lots of organic matter, well-drained soil, and nitrogen. Must have full sun in cool areas, partial shade in hot areas. Prefer acidic soil. May need some irrigation. Plant 18 inches apart. Have thorns and spread by suckers. Fire-resistant. Susceptible to oak root fungus. Cast light shade. Flower April- Aug, ripen May- Nov. Propagated from hardwood cuttings, division, and layering.



Red Huckleberry (*Vaccinium parvifolium*)- native, shade-tolerant, 3- 5 ft deciduous shrub produces tart red yummy berries high in vit C and antioxidants. Grows on rotting wood. Prefers well-drained, acidic soil. Drought-tolerant. Red Fall foliage. Resistant to oak root fungus. Flowers May- June, ripens July- Aug. Propagated by layering, division.




Salal (*Gaultheria shallon*)- native, shade and salt-tolerant, evergreen shrub growing 2 ft tall in sun and up to 6 ft tall in shade produces blueberry-like fruit. Likes acidic soil. Drought and wind-tolerant. Spreads by suckers. Fire-resistant. Easy to grow. Great hedge. Deer and disease-resistant (including oak root fungus). Flowers April- July, ripens June- Oct. Propagated from cuttings, division.




Salmonberry (*Rubus spectabilis*)- native, shade-tolerant, 6 ft semi-deciduous shrub related to raspberry produces large orange berries in May. Small spines. Pretty flower. Likes moist places. Tolerates low pH. Spreads by suckers. Fire-resistant. Good hedge. Susceptible to oak root fungus. May inhibit growth of nearby plants. Casts light shade. Flowers Febr- April, ripens May- July. Propagated from cuttings, division, layering.




Seaberry or Sea Buckthorn (*Hippophae rhamnoides*)- 6- 10 ft, nitrogen-fixing, extremely thorny shrub, amazingly productive of sour, orange/passionfruit-flavored berries high in essential fatty acids, antioxidants, Ca, Fe, K, Mn, vit A and E, and very high in vit C. Used medicinally and as an orange juice substitute, when sweetened. Leaves are up to 24% protein (higher than alfalfa) and make a very nutritious tea. Produces even in 50% shade. Tolerates drought and salt. Does not like very heavy or wet soils. Thornless varieties exist, but are not widely available. Spreads by suckers. Needs both sexes for fruit.

Excellent hedge. No pest (including deer) or disease problems (including oak root fungus). Casts light shade. Flowers April- May, ripens Sept- Oct. Propagated by cuttings, division, layering.




Serviceberry (*Amelanchier* spp.)- native, shade-tolerant, beautiful 8- 15 ft shrub produces delicious, blueberry-like fruit high in antioxidants. Cultivars (saskatoons) have larger, tastier, and more abundant fruit. Tolerates heavy, wet Winter soils. Fall color. Many species spread by suckers. Fire-resistant. Great hedge. Susceptible to cedar-apple rust when near incense cedar (*Calocedrus decurrens*). Flowers April- May, ripens June- July. Propagated from basal cuttings, layering.

Strawberry Tree- several dwarfs available. 'Elfin King' reaches only 5 ft. See listing under Short Fruit Trees.




Strawberry Guava *(Psidium cattleianum* or *P. littorale littorale*)- 15 ft evergreen shrub that produces 1- 1 ½ inch strawberry guavas. Lemon guava is similar, but produces sweeter, yellow fruit. Needs sun and well-drained soil. Takes 20- 23°F. Easy to grow. Good hedge. Deer and disease-resistant (including oak root fungus). Flowers May- Sept, ripens July- Oct. Propagated by seed, cuttings, root suckers, layering.




Thimbleberry (*Rubus parviflorus*)- native, shade-tolerant, fuzzy-leaved, deciduous, 2- 4 ft canes related to raspberry produce medium-sized, flavor-packed berries that taste even better. Produce better in at least partial sun. Tolerant of drought and late frost. Big white flowers. Spreads by suckers. Fire-resistant. Good hedge. Susceptible to oak root fungus. Flower April- June, ripen June- Aug. Propagated from cuttings, division, layering.




Tree Tomato or Tamarillo (*Cyphomandra betacea*)- short-lived evergreen shrub up to 12 ft produces yummy, 2- 3 inch tomato/guava-like fruits high in Fe and vit C and E. Needs warm, sheltered site with moist, well-drained soil. Hates wind and hail. Mulching protects its shallow roots. Leaves and twigs are killed at 28°F. Said to die at 25°F, but plants are doing well in the Santa Cruz Mountains. Should not be permitted to fruit the first year. Aphids can be a problem. Flowers May- Nov, ripens Nov- March. Propagated by seed, cuttings.


Wolfberry or Boxwood (*Lycium chinense* and *L. barbarum*)- 8 x 12 ft shrubs produce lots of very nutritious, medicinal red berries over a long season. Berries resemble little chilies, have a raisin/tomato flavor, can be eaten fresh or dried, and are high in protein (15%), B vitamins, antioxidants, minerals, and vit A, C, and E. Leaves are also edible and are high in Ca. Need sun and well-drained soil. Prefer basic soil. Drought-tolerant. Good as a living fence or for covering walls, banks, rocks, etc. Protect young plants from mollusks. There are several *Lycium* species native to southern California that should be tried for edibility. Flower May- June, ripen Aug- Nov. Propagated from cuttings.

Fruiting Vines




Akebia (*Akebia quinata, A. trifoliata*)- up to 36 ft beautiful, fast-growing vines produce occasional 3- 5 inch fruit with a roll of tapioca-like pulp. The young shoots can be used in salads. Prefer a warm, humid site with partial shade and well-drained

soil. Vulnerable to late frosts. Tolerate wide pH. Evergreen in very mild areas. May flowers are very fragrant. Need two varieties for fruit. Fall color. Can be grown as a groundcover. Vines used for basket-making. Resistant to oak root fungus. Flower March- May, ripen Sept- Oct. Propagated by cuttings, layering.


Arctic Beauty Kiwi (*Actinidia kolomikta*)- up to 30 ft shade-loving, ornamental vine that produces a smooth fruit the size of a large grape, high in vit C (similar to hardy kiwi). Males have leaves that are splashed with pink and white. Leaves edible when cooked. Needs well-drained soil and lots of water and nitrogen. Tolerates late frost, unlike other kiwis. Hates heat, therefore experimental in Zone 9. Must have both sexes for fruit. Prune as for fuzzy kiwi. No pest or disease problems (including oak root fungus), except for mollusks when young. Flowers April- June, ripens Aug- Sept. Propagated from cuttings.




Fuzzy Kiwi (*Actinidia deliciosa*)- up to 60 ft fast-growing vine that produces the familiar, long-storing fruit in late Fall that is high in Ca, Cu, K, Mg, Mn, B vitamins, and in vit E, K, and C (one fruit provides enough for a day). Can produce over 100 pounds of fruit. Needs good trellis, well-drained soil, and lots of water and nitrogen. Prefers acid soil. Fruits can be damaged by frost. Fruiting occurs on the first 3- 6 buds of the current year's growth. For greater production, prune out branches older than 3 years. Takes 4- 5 years to fruit. Easy to grow. 'Saanichton' is the best variety for cooler areas. Both sexes needed for fruit. No pest or disease problems (including oak root fungus), except for mollusks when young. Males pollinate hardy kiwi. Deer-resistant. Flowers May- Aug, ripens Oct- Nov. Propagated from seed. cuttings.




Grape (*Vitis* spp.)- fast-growing and productive vines with numerous varieties. Fruit high in Cu, K, B vitamins, and vit C and K. Bear fruit on current year's growth (which is most productive from last year's growth). Edible leaves. Drought-tolerant. Prefer well-drained soil. Need lots of sun and heat. Low heat and disease-resistant varieties best. Easy to grow. Some varieties have beautiful Fall foliage. Said to resist diseases better when grown into mulberry. Susceptible to oak root fungus. Flower May- June, ripen Aug- Oct. Propagated from cuttings, tip layering.




Hardy Kiwi (*Actinidia arguta*)- up to 45 ft fast-growing vine that produces a smooth, 1 ½ inch fruit that is sweeter than the fuzzy kiwi, has five times the vit C of an orange, and is high in Cu, K, Mn, antioxidants, folic acid, and vit A and E.. Can produce over 100 pounds of fruit. Tolerates partial shade and does better with partial shade in hot areas. Needs good trellis, well-drained soil, and lots of water and nitrogen. Vulnerable to late frosts, so avoid frost pockets. Can be finicky in Zone 9. Prune as for fuzzy kiwi. Most varieties need both sexes for fruit. No pest or disease problems (including oak root fungus), except for mollusks when young. Males pollinate fuzzy kiwi. Flowers May- July, ripens Sept- Oct. Propagated from cuttings.


Himalayan Damarru (*Maclura conchinensis*)- fast-growing, shade-tolerant, evergreen vine or shrub that produces sweet, raspberry-like, velvety fruits that taste like of mixture of raspberries, peaches, and cream. Drought-tolerant. May take many years to fruit (no fruits have been reported yet in the US). Has thorns. Deer-resistant. Ripens Sept- Oct. Propagated from cuttings.




Japanese Wineberry (*Rubus phoenicolasius*)- shade-tolerant, attractive shrub that can get up to 9 ft tall and 6 ft wide that produces small, raspberry-like fruits in abundance. Prefers well-drained soil and wind protection. Has weak thorns and spreads by suckers. Fire-resistant. Susceptible to oak root fungus. Flowers May- July, ripens July- Sept. Propagated from cuttings, layering, division.


Keriberry (*Rubus rugosus*)- tropical evergreen climbing blackberry that produces fruit year-round, but is only hardy to 22°F. Tolerates partial shade. Fire-resistant. Susceptible to oak root fungus. Propagated from cuttings, layering, division.




Magnolia Vine (*Schisandra chinensis*)- 30 ft, shade-loving, medicinal vine produces lots of ½ inch tart, red berries high in antioxidants and vit C. Leaves and stems are also edible when steamed. Needs well-drained, moist soil and protection from intense sun. Vulnerable to late frosts. Experimental in Zone 9. 'Eastern Prince' is self-fertile. Protect young plants from mollusks. Flowers April- May, ripens Sept.




Maypop Passionfruit (*Passiflora incarnata*)- up to 18 ft, fast-growing, evergreen vine with beautiful edible flowers and an egg-sized, banana-flavored passionfruit high in Fe, K, Mg, niacin, riboflavin, and vit A and C. Leaves are also edible. Tolerates wet and heavy soils. Top dies back at 20°F and quickly grows back next Spring. Spreads by suckers, which can be quite aggressive. Contain roots to increase fruiting. If pollination is a problem, hand-pollinate a fresh flower in the morning using a flower from the previous day. Pest and disease- resistant (including oak root fungus). Flowers June- Oct, ripens Sept- Nov. Propagated from cuttings, division.




Sausage Vine (*Holboellia coriacea*)- shade-tolerant, evergreen vine that produces a 2- 4 inch seed pod with sweet, mealy pulp. Also bears profuse fragrant white flowers. Hardy to 0°F. Prefers well-drained soil. Flowers April- May, ripens July- Sept. Propagated by cuttings, layering.



Stauntonia (*Stauntonia hexaphylla*)- evergreen vine produces sweet, walnut-shaped, purple fruits and fragrant white/violet flowers. Prefers well-drained soil. Vulnerable to late frosts. Doesn't like cold wind. Tolerates 15°F. Flowers April, ripens Oct. Propagated by cuttings.




Taxo or Banana Passionfruit (*Passiflora mollissima*)- fast-growing, evergreen vine with pretty, pink edible flowers (nearly all year in warmest areas) that produces up to 300 4- 6 inch fruits a year high in Fe, K, Mg, B vitamins, and vit A and C. Leaves are also edible. Needs irrigation. Loves heat. Fruits store well. Tolerates 23- 24°F. Resistant to oak root fungus. Flowers June- Oct, ripens June- April. Propagated from seeds, cuttings, division.

Perennial Vegetables

(Most of these plants belong to the herb layer, but a few can or must occupy other layers. These species can be propagated by seed in addition to the methods listed for some plants. This list is incomplete. Many more plants are available and awaiting discovery by food foresters.)

Alfalfa (*Medicago sativa*)- excellent biomass-producer and nitrogen-fixer as well as green (eat the young shoots). Should be eaten in moderation, but high in protein, B vitamins, and vit A, C, and K. There are both annual and perennial varieties. Doesn't like wet soil. Prefers alkaline soil. Deep roots accumulate P, and Fe. Fire-resistant. Negatively impacted by black walnut. Insectary. Flowers June- July.

Arrowleaf Balsamroot (*Balsamorhiza sagittata*)- 1- 2 ft, native sunflower with edible leaves, stems, and root. Flowers April- June.

Artichoke (*Cynara scolymus*)- biomass-producer as well as vegetable. Grows 4 ft tall and wide and lives 3- 4 years unless thinned-out. As a percentage of calories, the flowers are high in protein and almost every other vitamin and mineral. Stems can be eaten as they are or blanched like cardoon. Deer-resistant. Insectary. Flowers June- Sept. Propagated from divisions.

Asparagus (*Asparagus officinalis*)- 3- 5 ft tall with pretty, fern-like leaves. High in B vitamins, and vit A, C, and K. Needs well-drained soil and full sun. Prefers alkaline soil. Takes 2- 3 years to produce (allow shoots to grow the first year) and lives for 15 years. Plant 1 ft apart. Allelopathic. Flowers Aug. Propagated by crown divisions.


Bamboo- edible shoots from many species (a good way to control running types). Species grow 8- 60 ft tall and have innumerable uses. Shoots high in K. Drought-tolerant. Prefer well-drained soil high in organic matter. Flammable if not maintained. Cut the shoots of larger species underground and the others at ground level. Resistant to deer and oak root fungus. Propagated from divisions, rhizome cuttings, basal cane cuttings, and only rarely from seed.

Beach Pea (*Lathyrus japonicus*)- nitrogen-fixer native to the coasts has edible peas and young pods (2 ½ inches). **Caution**: be sure you have the right species as many peas are poisonous. Likes full sun and good drainage. Salt-tolerant. Flowers May- Aug.



Bear's Breech (*Acanthus mollis*)- 4- 5 ft plant with 2 ft leaves commonly grown as an ornamental. Shade and drought-tolerant. I've

eaten the stems and tender, abundant roots without problems, but consider this one experimental. Potentially invasive. Deer-resistant. Flowers June- Aug. Propagated by divisions.


Bitter Melon (*Momordica charantia*)- 20 ft vine, perennial in Zone 9, produces a bitter squash-like fruit high in vit C and folate. Younger fruits are less bitter. Young leaves may be used as greens and are high in B vitamins, Mg, Mn, and vit A, C, and K. Needs lots of sun, water, and fertilizer.

Black Salsify (*Scorzonera hispanica*)- 2- 3 ft, shade-tolerant plant with edible leaves and roots. Flowers June- Sept.


Campanula spp.- numerous species, usually about 3 ft tall, with edible leaves and flowers. Some are shade-tolerant. Insectary. Propagated from cuttings, division.



Canna Lily or Achira (*Canna edulis*)- reaches 4- 10 ft in full sun and produces big starchy roots (high in potassium), edible young leaves and stalk (10% protein), and edible, but rare, flowers and seeds. Older roots get fibrous. Tolerates partial shade and wet soils. Flowers April- Oct. Propagated from divisions.


Cardoon (*Cynara cardunculus*)- ancestor of artichoke grows up to 6 ft and produces similar but less fleshy flower. Grown primarily for its stems, which get less bitter (sometimes) when shaded (blanched) for 2 weeks. Also a good biomass-producer and fruit tree guild member. Deer-resistant. Considered invasive in California's Central Valley. Insectary. Flowers June- Sept. Propagated by divisions.


Chayote (*Sechium edule*)- sprawling deciduous 50- 80 ft vine that produces a squash-like fruit high in Ca, Cu, K, Mg, Mn, and Zn, and very high in B vitamins and vit C. First 4- 6 inches of vine tips and roots also edible. Needs excellent drainage, lots of nitrogen and water, and a long growing season. Tubers can rot during wet Winters. Needs a warm, sheltered spot in Zone 8. Two needed for pollination. Easy to grow. Disease-resistant. Propagated by planting fruit on side.

Chicory (*Cichorium intybus*)- leaves sold as Italian Dandelion for salads but also good for cooking. Leaves are very nutritious, being high in Ca, Fe, Mg, Zn, B vitamins, and vit E, very high in Cu, K, Mn, folate, and vit A and C, and super high in vit K. Produces 4 ft stalks with blue, edible flowers if not cut back. Roasted root can be used as coffee substitute. Can grow in partial shade and wet soil. Prefers acid soil. Drought-tolerant. Deep taproot accumulates Ca and K. Good insectary. Flowers July- Oct.

Chives (*Allium schoenoprasum*)- 1 ½ ft, can grow in partial shade. High in Ca, Cu, Fe, K, Mg, Zn, and B vitamins, very high in Mn, folate, and vit A and C, and very high in vit K. Edible flowers. Accumulates Ca and Na. Fire-resistant. Good insectary. Flowers April- July. Propagated from divisions.

Comfrey *(Symphytum officinale*)- up to 3 ft tall, amazingly productive and multi-functional plant. Great in swales, as living mulch at base of fruit trees, or as garden weed barrier . Deep roots bring up nutrients. Biomass-producer capable of being cut-back several times a year. Leaves used to heal wounds and as a green. Said to be a source of vit B12, protein, Si, N, Mn, Ca, K, and Fe. Edible flowers attract pollinators. Can grow in partial shade, heavy clay, and poorly drained soil. Drought-tolerant.

Russian comfrey (*S.* X *uplandicum*) is the best species as it is more productive, less invasive (it rarely produces seed), and accumulates more K. *S. grandiflorum* is a 4 inch, slowly-spreading groundcover (right image). Fire and deer-resistant. Flowers May- June. Propagated from divisions and pieces of root (can be hard to eradicate).


Cow Parsnip (*Heracleum lanatum*)- this native herb produces huge white umbels up to 5 ft tall and lots of organic matter. Its young leaves and stems were eaten by Native Americans in the Spring, though its skunky flavor takes some getting used to. Deep taproot accumulates nutrients. Drought-tolerant. Good insectary. Flowers March- May.


Daffodil garlic (*Allium neapolitanum*)- 1 ft shade-tolerant perennial onion with white bell flowers used ornamentally. Dies back in Summer. Drought-tolerant. Deer-resistant. Flowers March- May. Propagated from divisions.

Dandelion (*Taraxacum officinale*)- leaves are high in Ca, Cu, Fe, K, Mg, Mn, Zn, B vitamins, and vit E, very high in vit C, and super high in vit A and K. Roasted root is a coffee substitute. Edible flowers. Shade and drought-tolerant. Cultivars available. Deep taproot accumulates Na, Si, Mn, Ca, K, P, Fe, and Cu. Deer-resistant. Good insectary. Flowers March- Sept. Propagated from divisions.


Daylily (*Hemerocallis* spp.)- 18- 24 inch plant with beautiful edible flowers throughout the Spring and Summer, followed by edible bean-like seedpods. Tolerates partial-shade, drought, and heavy, wet soil. Fire and deer-resistant. Propagated by division.

Egyptian Topset (Walking) Onion (*Allium cepa viviparum*)- 2- 4 ft, evergreen, can be used like chives, but also produces bulbils on top. High in vitamins and minerals. Propagated by division and bulbils rather than seed.

Fennel (*Foeniculum vulgare*)- 5 ft tall with yummy anise-flavored leaves and seed. High in Ca, Cu, Fe, K, Mg, Mn, B vitamins, vit A, and very high in vit C. Edible root. Cut back to encourage leaf production. Partial shade and drought-tolerant. Dislikes acid soils. Deep taproot accumulates Na, S, and K. Deer-resistant. Slightly allelopathic. Insectary. Flowers Aug- Oct. Propagated from divisions.

Fragrant Spring Tree (*Toona* or *Cedrella sinensis*)- 40 ft tall tree produces onion-flavored tender leaves rich in A that can be used in stir-fries or salads. Tolerates basic soils. Vulnerable to late frosts. Can be kept much smaller as a hedge. Pest and disease-resistant. Flowers July. Propagated from cuttings.

Garlic (*Allium sativum*)- 2- 3 ft, some varieties (such as rocambole [*A. s. ophioscorodon*] which is also evergreen) produce both edible leaves and bulbils on top of the stalk. High in Ca, Cu, Fe, K, Mn, B vitamins, and vit C. Most varieties dormant during Summer. Accumulates F, S, and P. Deer-resistant. Propagated by division and bulbils (when present).

Garlic Chives (*Allium tuberosum*)- 16 in, shade-tolerant, garlicky chives. Edible flowers. Said to confuse pest insects. Insectary. Flowers Aug- Sept. Propagated from divisions.

Garlic Cress (*Peltaria alliacea*)- 1 ft tall evergreen, spreading plant whose garlic/mustard- flavored leaves can be harvested year-round. Flowers June.


Golden Saxifrage *(Chrysosplenium alternifolium*)- 8 inch, shade-tolerant groundcover for salads that is tolerant of wet, acidic soils. *C. glechomifolium* is native and should be tried. Fire and deer-resistant. Flowers April- July.

Good King Henry (*Chenopodium bonus-henricus*)- 1 ft tall, nutritious, shade-tolerant, and self-sowing green related to quinoa. High in Fe. Grows in poor soil. Insectary. Flowers May- July. Propagated by division.




Groundcherry or Goldenberry (*Physalis peruviana*)- 3 ft, sprawling, tomato-like plant producing yellow, cherry-sized, sweet fruits (high in vit A, B6, C, and P, and in Fe, P, and carotene) in a husk that store well. Takes 14°F. Fruits all year in warmest areas, but usually herbaceous. Needs lots of heat and sun. Flowers July- Oct, ripens Aug- Nov. Propagated by cuttings.


Groundplum Milkvetch (*Astragalus crassicarpus*)- 1 ½ ft tall nitrogen-fixer with edible seedpods native to the Great Plains. Tolerates partial shade. Needs well-drained, dry soil. Difficult to grow. **Caution**: be sure you have the right plant because many other milkvetches are poisonous (and are called 'locoweed').



Hops (*Humulus lupulus*)- rampant, herbaceous, 15- 25 ft vine whose edible flowers are used to flavor beer also produces edible shoots in Spring that can be treated like asparagus. Usually needs full sun, well-drained soil, and lots of water, but can be grown in the shade without much irrigation once established if there is a lot of humus in the soil. Insectary. Flowers July- Aug. Propagated from cuttings and suckers.

Horseradish (*Armoracia rusticana*)- 2- 4 ft, shade-tolerant producer of greens and pungent root high in minerals and vit C. Tolerates poor drainage and clay soil. Deer-resistant. Allelopathic. Flowers April- June. Propagated from divisions and pieces of root (can be hard to eradicate).



Horseradish Tree (*Moringa oleifera*)- 25 ft, superfast-growing, ornamental deciduous tree that makes a 15 inch seedpod and 2 ft leaves which are both edible. Can be maintained at 3- 4 ft. Leaves contain 7- 10% protein and are high in most minerals, B vitamins, and vit A, C, and K. Seems to need a lot of heat to be worthwhile. Tolerates drought, wide pH, and well-drained, heavy clay soil. Takes light frosts, but it will resprout if the top dies back and grows so fast that it is worth trying in mild areas. Can be used as a living fence. Propagated by cuttings.

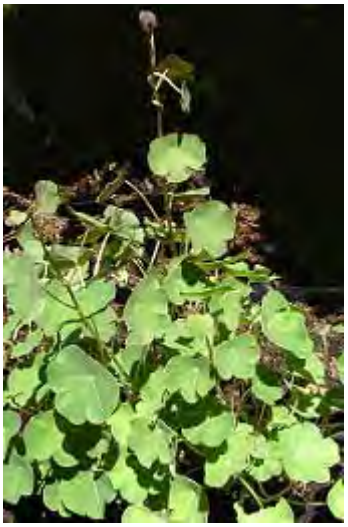
Japanese Coltsfoot or Butterbur (*Petasites japonicus*)- large, shade-tolerant, fast-growing and spreading vegetable that comes in two forms: fuki is 3- 4 ft tall, akita-buki is 6 ft tall. Flower buds, stems, and rhizomes are edible. Likes moist and tolerates wet soil. Needs lots of space. Easy to grow. Potentially invasive in wet areas. Flowers Febr. Propagated from divisions.


Linden or Basswood (*Tilia* spp.)- 40- 90 ft tall, shade-tolerant tree whose young leaves make a delicious salad plant and that can yield from April to September if maintained as a hedge or coppice. Pretty Fall foliage. Resistant to oak root fungus. Insectary. Flowers July. Propagated by layering suckers.

Lovage (*Levisticum officinale*)- celery-like plant can get up to 4 ft and grows in partial shade. Leaves used in salads, as well. Cut down flowering stalks to maintain leaf production. Good insectary. Flowers July- Aug. Propagated by division.



Mallow (*Malva* spp.)- various species with edible leaves and flowers that can be used as a lettuce substitute. *M. moschata* is one of the best. Deep taproot. Tolerant of partial shade. Insectary.



Mashua (*Tropaeolum tuberosum*)- edible roots and greens that make a nice groundcover/vine and can grow in partial shade and cloudy areas. Tubers contain around 14% protein when dried. Prefers its roots in shade and tops in the sun, with moist soil. Hates heat. Related to nasturtium. Most varieties need a long growing season to produce tubers (6- 8 months). Mounding increases yields. Last year's plants will survive after tuber removal in mild areas, otherwise store seed tubers in dry sand or sawdust. Protect young shoots from mollusks. Propagated by stem cuttings and not by seed.


Milkweed (*Asclepias* spp.)- numerous species with edible young shoots, stem tips, flower buds, and seed pods. Prefers dry, light soil. Insectary.


Mitsuba (*Cryptotaenia japonica*)- up to 3 ft, shade-dependent, evergreen perennial Japanese parsley. Blanched stems can be used like celery. Tolerates wet soil. Insectary. Flowers April- July. Propagated by division.

Nettles (*Urtica dioica*)- up to 5 ft (usually 2- 3) native, shade-tolerant, nutritional vegetable used as medicine for both people and plants. High in protein, Fe, Na, S, N, Ca, K, P, and Cu. Tolerates wet soil. Stingers contain formic acid. Deer-resistant. Propagated by division.


New Zealand Spinach (*Tetragonia expansa*)- creeps along the ground and is used like spinach. High in minerals, B vitamins, and vit A and C. Tolerates partial shade. Salt-tolerant. Fire and deer-resistant. Invasive along California beaches. Propagated from cuttings, divisions.

Nine-star Perennial Broccoli (*Brassica oleracea botrytis aparagoides*)- forms small heads and lives about 5 years. High in folate and vit C and K. Tolerates partial shade. Propagated from cuttings.


Oca (*Oxalis tuberosa*)- root crop with edible greens that forms a groundcover. Tubers contain up to 9% protein when dried. Sun dry tubers for three days to sweeten them up. Tolerates partial shade. Related to wood sorrel (*O. oregana*). Most varieties need a long growing season to produce tubers. Mounding increases yields. Last year's plants will survive after tuber removal in mild areas, otherwise store seed tubers in dry sand or sawdust. Can be propagated by cuttings and not from seed.


Perennial Buckwheat (*Fagopyrum dibotrys*)- up to 4 ft tall and spreading, with seeds like buckwheat and edible greens (when cooked). Tops die back in Winter. Tolerant of partial shade and heavy, poor soil. High in rutin and vit B6. Good insectary. Flowers Sept. Propagated by divisions.

Perennial Kale (*Brassica oleracea acephala*)- up to 6 ft tall if not cut back, with good yields and flavor. High in most minerals, B vitamins, and vit A, C, and K. Unfortunately, in warmer areas, it puts all its energy into flowering from Spring through Summer, like its annual relative. Tolerates alkaline soil. Aphids can be a problem. Propagated by cuttings and occasionally by seed.

Perpetual Swiss Chard (*Beta vulgaris*)- productive and better-tasting than conventional chards. High in nearly all vitamins and minerals, but especially in Fe, K, Mg, Mn, and vit A, C, and K. Tolerates partial shade. Prefers alkaline soil. Puts all its

energy into flowering during the first Summer and can reach 6 ft if not cut back. Propagated from cuttings, divisions.


Pignut or Earth Chestnut (*Bunium bulbocastanum*)- edible chestnut-like root, parsley-like greens up to 2 ft, and cumin-like seed. Tolerates alkaline soil and partial shade. Flowers June- July. Propagated by division.


Plantain (*Plantago* spp.)- extra yummy green in Winter, this common weed makes a great path groundcover and is shade-tolerant. Gets extra big when treated like a vegetable. Tolerates heavy, wet soil. Used to relieve bee-stings. Accumulates Si, S, Ca, K, Fe, and Cu. Deer-resistant. Flowers April- Sept. Propagated from divisions.


Potato (*Solanum tuberosum*)- produces in partial shade and acts as a living mulch. Tubers contain 8- 10% complete protein, when dried, and are high in Cu, Fe, K, Mg, Mn, B vitamins, and vit C. Can be grown all year in mildest areas. Tolerant of sandy or heavy soils. Prefers acid soil. An amazing diversity of potato species, hybrids, and varieties exist in South America which could improve the use of potatoes in other parts of the world. Avoid disturbing the roots of other plants when harvesting tubers. Growing under apple can encourage blight. Negatively impacted by the juglone of black walnut. Propagated by pieces of tuber or whole tuber and rarely by seed.

Ramps (*Allium tricoccum*)- this delicious wild onion is a Southern favorite, with broad , flat leaves. Grows under trees in moist, humus-rich soil. Summer-deciduous. Ramsons (*A. ursinum*) is a similar species from Europe. Flowers June- July. Propagated by division.

Rhubarb (*Rheum rhabarbarum*)- 3- 5 ft tall herb can grow in partial shade. Stems can be used like a fruit or a vegetable and are high in Ca, K, Mg, Mn, and vit C and K. Harvest no more than half of the stems. Prefers acid soil. Available April-Oct (or all year in mildest areas). **Leaves extremely poisonous!** Fire and deer-resistant. Propagated by divisions (transplanted roots usually rot).

Runner Bean (*Phaseolus coccineus*)- perennial in warm Winter areas, young pods and mature beans are edible. Protect young shoots from mollusks. Flowers May- Oct.



Salt Bush (*Atriplex canescens*)- 6 x 9 ft California native, evergreen shrub with salty leaves and stem tips used as greens. Likes sandy and salty but not heavy soil. Tolerates high pH. Needs sun. Drought-tolerant. Fire-resistant and retardant. Propagated by cuttings.

Seakale (*Crambe maritima*)- up to 2 ft, sometimes takes months for its seed to germinate, but it makes an excellent green. Dislikes heavy and acidic soil. Prefers basic soil. Tolerates salt, drought, and partial shade. Can grow in poor soil. Locally established on Oregon beaches. Insectary. Flowers June- Aug. Propagated by division, root cuttings.

Society Garlic (*Tulbaghia violacea*)- 1 ft evergreen, shade-tolerant, false garlic used for its garlicky greens. Leaves harmed at 20°F, but will resprout from roots. Fire and deer-resistant. Repels aphids. Lavender flowers April- Nov. Propagated from divisions.

Sorrel (*Rumex scutatus*)- up to 3 ft tall, shade-tolerant green high in oxalic acid. Use sparingly in soups and salads. Tolerates wet soil. Accumulates Na, Ca, and P. Deer-resistant. Bloodwort (*R. sanguineus*) is similar, but less acidic. Weedy docks, such as fiddle dock (*R. pulcher*) can also be nice in salads or steamed. Propagated by divisions.




Sunchoke (*Helianthus tuberosus*)- native American rootcrop whose edible tops look like 4- 15 ft sunflowers. Tubers contain inulin (like yacon), which is indigestible, but increases beneficial bacteria, improves the intake of Ca and other minerals, and may prevent cancer. They are also 7% protein and high in Cu, Fe, K, Mg, B vitamins, and vit C. Harvest tubers after the first frost or later. Tolerates partial shade and poor drainage. Sometimes needs Summer water. Can be used as a seasonal screen. Deer-resistant. Insectary. Flowers Oct. Propagated from root pieces (can be hard to eradicate).

Tree Collards (*Brassica oleracea*)- rambling cabbage that just keeps on producing. High in Ca, K, Mg, Mn, B vitamins, and vit A, C, and K. Partial shade-tolerant. Can grow up to 6 ft and must be cut back every few years in order to keep it alive (leave at least a foot). Pretty Fall color. Propagated by cuttings.

Turkish Rocket (*Bunias orientalis*)- up to 3 ft, producing mustardy leaves. Tough plant. Tolerates partial shade. Insectary. Flowers May- Aug. Propagated by division, root cuttings.

Ulluco or Melloco (*Ulluco tuberosus*)- groundcover with nutritional greens as well as root. Tubers are up to 15% protein (when dried) and are high in vit C. Most varieties need a long growing season to produce tubers. Mounding increases yields. Can be propagated by stem cuttings.

Violet (*Viola* spp.)- groundcover with numerous species which are all totally edible (except maybe the yellow-flowered ones) and shade-tolerant. *V. odorata* reaches 4 in and is excellent for salads. Deer-resistant. Some species can be invasive.

Waterleaf (*Hydrophyllum* spp.)- 6 inch, shade-tolerant groundcover makes a good lettuce substitute in Spring, before the leaves get too fuzzy. Flowers May. Propagated by division.

Watercress (*Nasturtium officinale*)- needs flowing water or wet soil. High in Ca, Cu, K, Mg, Mn, B vitamins, and vit A, C, E, and K. Accumulates Na, F, S, Mn, Ca, K, P, and Fe. Flowers May- Oct. Propagated from cuttings.

Welsh Get Set Red Onion (*Allium fistulosum*)- up to 2 ft tall, evergreen bunching onion. High in Ca, Cu, Fe, K, Mg, Mn, Zn, B vitamins, and very high in vit A and C. Scallions are a smaller form of this species. Flowers May- July. Propagated by division.



Yacon (*Polymnia edulis* or *sonchifolia*)- 3- 6 ft productive plant with large, sweet tubers (6- 7% protein when dried and high in K and in indigestible inulin, which is easily converted to fructose or alcohol) and edible young stems high in protein. Tolerates shade. Harvest tubers after flowering in Oct- Dec and return base of plant to soil for next year. Related to sunchokes. Protect young shoots from mollusks. Propagated from cuttings, division, rarely from seed in our region.

Yam (*Dioscorea* spp.)- several species of very productive vines that produce nutritious tubers up to 3 ft long (growing vertical). High in K, thiamin, and vit C. Most productive when planted 1 ft apart for two years. Likes sunshine. Flowers Sept- Oct. Propagated by top 6 in of root, basal stem cuttings, and tubercles formed in leaf axils, and not by seed.

Yucca (*Yucca baccata*)- 3 ft, produces a large date-like fruit, or edible flowering stems, flowers, and seeds. Probably needs hand-pollination. Drought-tolerant. Other yuccas may also be edible. Fire and deer-resistant. Flowers Aug. Propagated by division.

Shade-tolerant Perennial or Self-sowing Herbs

(Most of these plants belong to the herb layer, but a few can or must occupy other layers. These species can be propagated by seed in addition to the methods listed for some plants. This list is very arbitrary. Many more herbs could have been included and/or are awaiting discovery.)

Aloe (*Aloe vera*)- 1- 2 ft medicinal plant. High in Ca, Cu, Cr, Fe, K, Mg, Mn, Zn, B vitamins, and vit A, C, and E. One of the few plants to contain vit B12. Tolerates partial shade and drought. Zone 9 only. Fire and deer-resistant. Flowers Spring-Summer. Propagated by division and rarely by seed.

Angelica (*Angelica hendersonii*)- native, up to 3 ft, good biomass producer. Young leaves taste like licorice and can be added to tart fruits when cooking to add sweetness, while the stems can be used like celery. Cutting back the plant before it flowers extends its life. Likes moist, acidic soil. Deep taproot accumulates nutrients. Insectary. Flowers April- June.

Anise Hyssop (*Agastache foeniculum*)- up to 3 ft tall North American native with delicious, anise-flavored leaves. Lives for about 3 years. Insectary. Flowers June- July.


Bee Balm or Bergamot (*Monarda didyma*)- 3 ft, good for tea and salads. Edible flowers. Needs moist soil. An ingredient in Earl Gray tea. Deer-resistant. Insectary. Flowers June- Sept. Propagated by basal cuttings, division.


Borage (*Borago officinalis*)- up to 3ft, with edible leaves and flowers that can be used in salads, steamed, or in iced tea. Rich in Si, K, and Ca, while seed oil has Omega-3 fatty acids. Tolerates heavy soil. Excellent insectary. Flowers Febr- Oct.

Calendula (*Calendula* spp.)- 1 ft tall with edible flowers. Deer-resistant. Insectary. Flowers Jan- July.


California Bay Laurel (*Umbellularia californica*)- native, 25- 80 ft tall evergreen tree whose leaves are used as seasoning. Can be kept as a small hedge. Seeds are reminiscent of hazelnuts when fully dried and roasted at around 425°F. When ground with sugar they taste like chocolate. Tolerant of full shade. Flammable. Susceptible to oak root fungus. Deer-resistant. Allelopathic. Flowers Dec- March.


Catnip (*Nepeta cataria*)- 2- 3 ft herb used in tea. Scientifically shown to reduce pests when planted with certain plants. Flowers July- Nov. Propagated from cuttings, division.


Chamomile (*Chamaemelum nobile*)- some varieties up to 6 inches tall. Good groundcover, lawn substitute. Repels biting insects and has many other uses. Deer-resistant. Insectary. Flowers June- July. Propagated from divisions.


Chervil (*Anthriscus cereifolium*)- 1 ½ ft, anise-flavored herb. Self-sows. Needs moist, well-drained soil. Best under deciduous perennials. Flowers May- June.

Chickweed (*Cerastium arvense*)- native groundcover green growing mostly in Winter and tolerant of full shade and heavy soil. Accumulates K, P, and Mn. Flowers Febr- Aug.


Columbine (*Aquilegia* spp.)- numerous species with edible flowers. Prefers some sun. Tolerates heavy soil. Fire and deer-resistant. Insectary.

Corn Salad (*Valerianella locusta*)- 1 ft, self-sowing green that tastes like lettuce. Needs Summer shade. Flowers April- June.

Garlic Mustard or Jack-by-the-Hedge (*Alliaria petiolata*)- up to 3 ft biennial green tasting of garlic and mustard. Can grow in full shade. Doesn't like acidic soil. Very invasive east of Rockies. Flowers April- June.

Goldenseal (*Hydrastis canadensis*)- difficult to grow, but important because wild plants are endangered. Needs well-drained, humusy soil. Flowers May- June. Propagated by division.


Hedge Nettle or Woundwort (*Stachys* spp.)- 1 ft native, with several species used as a steamed green. Deer-resistant. Flowers May-Sept. Propagated by division.


Houttuynia (*Houttuynia cameleon*)- variegated, deciduous groundcover with a ginger flavor. Spreads quickly. Tolerates wet soil. Flowers June-Aug. Propagated from cuttings, divisions.

Lady's Mantle (*Alchemilla vulgaris* or *xanthochlora*)- up to 1 ft tall groundcover. Used medicinally, but can also be eaten raw or cooked. Tolerates heavy clay. Flowers June- Sept. Propagated by division.

Lemon Balm (*Melissa officinalis*)- up to 2 ft tall, leaves have a wonderful lemon flavor and are good in salads or teas and make an insect repellent as well. Great lemongrass substitute. Tolerates heavy soil. Accumulates P. Deer-resistant. Can be invasive. Insectary. Flowers June- Oct. Propagated from cuttings, divisions.

Marigold (*Tagetes* spp.)- some species said to repel nematodes. Allelopathic. Insectary.

Miner's Lettuce (*Claytonia* spp.)- native Winter groundcover green tolerant of full shade. Candy flower (*C. sibirica*) is productive and tolerant of wet soils, but needs lots of humus and gets bitter in Summer. Flowers March-June.

Mint (*Mentha* spp.)- shade-tolerant groundcovers good for teas and salads. Tolerate wet, heavy soils. Peppermint (*M.* X *piperita*) accumulates Mn and K. Deer-resistant. Can be invasive. Good insectaries. Propagated from cuttings, divisions.

Mugwort (*Artemisia douglasiana*) - up to 5 ft, native sage that can produce a lot of biomass and is tolerant of wet or dry, heavy soil. Deer-resistant. Deters codling moth. Probably allelopathic. Insectary. Flowers July- Oct. Propagated by divisions.

Nasturtium (*Tropaeolum majus*)- self-sowing groundcover/vine and fruit tree guild member is perennial in warmer areas. Leaves and flowers edible. Can be invasive in coastal California. Reportedly deters woolly aphids. Attracts mollusks. Insectary. Flowers April- Sept. Propagated from cuttings.



Parsley (*Petroselinum crispum*)- self-sowing biennial. High in Ca, Cu, Fe, K, Mg, Mn, Zn, B vitamins, and vit A and E, and super high in vit K. Italian grows 2- 3 ft, while French grows 6- 12 in. Italian self-sows more successfully. Deep taproot. Accumulates Mn, Ca, K, and Fe. Insectary. Flowers June- Aug.

Pineapple Sage (*Salvia elegans*)- 3- 4 ft, leaf used in salads and tea. Fire and deer-resistant. Insectary. Flowers Oct- June. Propagated from cuttings.

Purslane (*Portulaca oleracea*)- 4 inch, self-sowing annual groundcover high in Fe, Ca, P, and omega-3 fatty acids. Fire and deer-resistant.


Rosemary (*Rosmarinus officinalis*)- various varieties. Edible flowers. May irritate skin. Fire and deer-resistant. Insectary. Flowers all year. Propagated from cuttings, layering.

Saffron Crocus (*Crocus sativus*)- takes a dozen flowers to flavor a meal. Grows best under deciduous trees. Tolerates heavy soil. Deer-resistant. Flowers Oct. Propagated by division.

Sage (*Salvia officinalis*)- up to 3 ft with edible flowers in addition to its leaves. Fire and deer-resistant. Repels codling moth. Insectary. Flowers June- Aug. Propagated from cuttings.

Salad Burnet (*Sanguisorba minor*)- up to 2 ft cucumber-flavored salad perennial self-sows freely. Can be quite bitter in acidic soil. Harvest using the cut-and-come-again method. Tolerates heavy soil. Accumulates Fe. Deer-resistant. Flowers May- Aug. Propagated by division.

Shungiku (*Chrysanthemum coronarium*)- self-sowing greens up to 3 ft tall with abundant and never-ending yellow, edible flowers. Used in chop suey, can be lightly cooked or eaten raw. Rich in vit B1. Harvest by the cut and come again method. Reported to reduce caterpillars and nematodes. Can get bitter during the Summer. Tolerates heavy soil. Good insectary. Flowers June- Nov.

Soapwort (*Saponaria officinalis*)- 3 ft tall. Spreads freely. Used for soap. Insectary. Flowers July- Sept. Propagated by division.

Sweet Cicely (*Myrrhis odorata*)- up to 3ft tall, productive plant with edible, licorice-flavored leaves. Can be added to rhubarb and tart fruit to add sweetness. Prefers moist soil. Insectary. Flowers May- June. Propagated by root cuttings.

Sweet Woodruff (*Galium odoratum* or *Asperula odorata*)- 1 ft groundcover, edible leaves and flowers. Can be invasive. Tolerates full shade. Prefers basic soil. Fire and deer-resistant. Flowers May- July. Propagated by division, cuttings.

Tansy (*Tanacetum vulgare*)- 3 ft, used sparingly in salads or as a substitute for nutmeg and cinnamon. Can spread. Accumlates K. Deer-resistant. Repels ants and codling moth. Insectary. Flowers Aug- Sept. Propagated by divisions.

Tarragon (*Artemisia dracunculus*)- 2 ft herbaceous insectary. Deters codling moth. Probably allelopathic. Flowers June- Aug. Propagated by basal cuttings, division.

Tea (*Camellia sinensis*)- 4- 15 ft tall evergreen shrub with small camellia flowers whose leaves are used for tea. Good hedge. Needs lots of organic matter, acidic soil, and good drainage. Needs partial shade in hot areas. Mature plants need occasional deep watering. Deer-resistant. Flowers Sept- Jan. Propagated from cuttings.

Thyme (*Thymus* spp.)- groundcover and insectary. Tolerates heavy soil. Fire and deer-resistant. Propagated from cuttings, divisions, and layering.


Valerian (*Valeriana officinalis*)- up to 5 ft, good biomass producer used in salads and medicinally. Tolerates heavy soil. Accumulates Si. Flowers June- Aug. Propagated by division.

White clover (*Trifolium repens*)- awesome nitrogen-fixing groundcover that can sometimes also be used in salads. Tolerates heavy and acidic soil. Accumulates P. Deer-resistant. Attracts gophers. Flowers April- Sept. Propagated by division.


Wild Ginger (*Asarum caudatum*)- native and shade-tolerant evergreen groundcover and medicinal with ginger-flavored leaves. Eat in small quantities only. Fire and deer-resistant. Flowers April- Aug. Propagated by division.



Yarrow (*Achillea millefolium*)- up to 2 ft, native herb makes a great groundcover and attracts beneficial insects. Grows in poor soil and is drought-tolerant. Accumulates N, P, K, and Cu. Fire and deer-resistant. Flowers April- Sept. Propagated by division.

Yerba Buena (*Satureja douglasii* or *Micromeria chamissonis*)- excellent native aromatic tea herb and groundcover. Tolerant of drought and heavy soil. Deer-resistant. Flowers April- May. Propagated by division.

Fruiting Groundcovers

(Look for other groundcovers under **Perennial Vegetables** and **Shade-tolerant Perennial and Self-sowing Herbs**.)



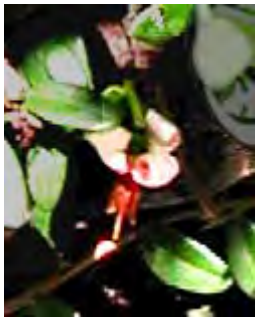
Alpine Strawberry (*Fragaria vesca*)- 1 ft tall, shade-tolerant, superior fruits planted by seed. Fruits year-round in warmest areas. Fruit is high in Cu, Fe, K, Mg, Mn, B vitamins, vit K, and very high in vit C. Edible leaves accumulate Fe. Does not runner. Likes lots of compost and water. Easy to grow. White-fruited variety less appealing to birds. Disease-resistant. Tolerates heavy clay and high pH. Flowers May- Nov, ripens June- Nov. Propagated by seed, division.

Blueberry- see listing under Fruiting Shrubs and Hedges.



Bunchberry (*Cornus canadensis*)- native, shade-dependent, slowly spreading, deciduous, 6 inch tall dogwood produces edible red berries from a single, broad, white flower. Likes acidic soil with lots of humus. Tolerates heavy clay. Sensitive to too much sun. Red Fall foliage. Flowers June, ripens Sept. Propagated by seed, division.






Cranberry (*Vaccinium macrocarpon*)- low-growing, spreading, evergreen North American native produces ½ inch cranberries from pink flowers. Fruit is high in antioxidants, Cu, K, Mn, and vit C, E, K, and B6. Needs acidic (preferably well-drained), well-watered soil, and at least partial sun. Flowers June- Aug, ripens Aug- Nov. Propagated from seed, cuttings, layering.




Emerald Carpet *(Rubus calycinoides*)- shade-tolerant, attractive, evergreen groundcover infrequently produces, small, yellow raspberries in July- Aug. Fire and deer-resistant. Flowers May- June. Propagated from seed, cuttings, layering, division.



Himalayan Bramble (*Rubus tricolor*)- very shade-tolerant, attractive groundcover that quickly forms extensive carpets and produces occasional, large red berries. Fire and deer-resistant. Flowers May- July, ripens Sept. Propagated by seed, cuttings, layering, division.



Japanese Strawberry-Raspberry (*Rubus illecebrosus*)- shade-tolerant, 2 ft herbaceous groundcover that produces a 1+ inch fruit. Fire-resistant. Flowers June- July, ripens Aug. Propagated by seed, cuttings, division, layering.



Lingonberry (*Vaccinium vitis-idaea*)- shade-tolerant, spreading, evergreen, 4-16 inch tall groundcover produces lots of tart red berries (high in vit C, antioxidants, and riboflavin) twice a year which stay fresh on the plants through Winter. Can be used in place of cranberries. Easy to grow. Prefers well-mulched, acidic soil with good drainage. May not fruit in warmer parts of Zone 9. Deer-resistant. Flowers May- June and Oct, ripens July and Nov. Propagated by division.


(New Zealand) Alpine Totara (*Podocarpus nivalis*)- 1- 2 ft, dwarfing, yew-like tree produces cherry-like drupe. Both sexes needed for fruit. Prefers well-drained soil. Deer-resistant. Ripens Oct. Propagated by seed, softwood cuttings.



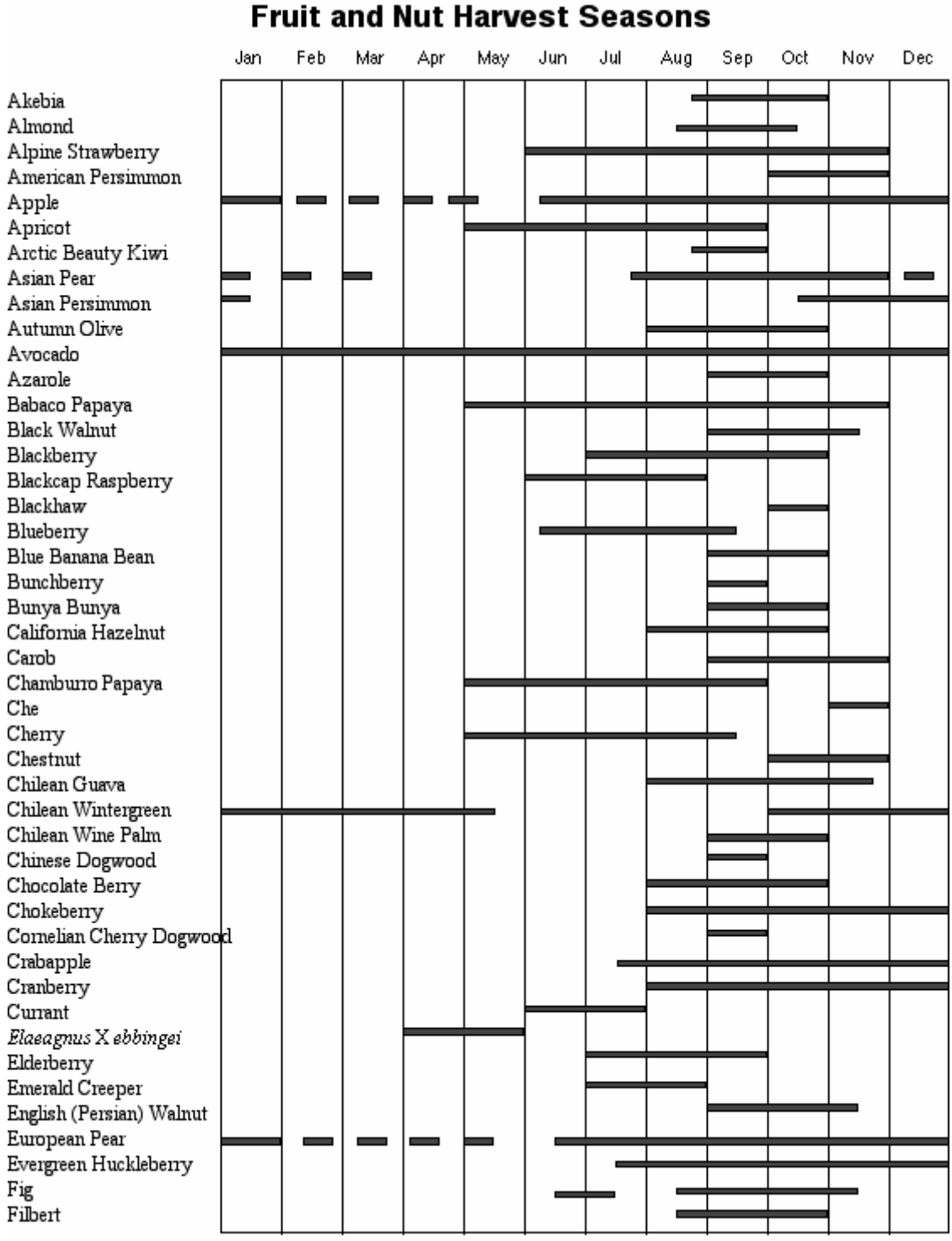

Pacific Blackberry (*Rubus ursinus*)- the native blackberry of the West Coast, often considered the best-tasting, is shade-tolerant and will trail all over (and can be trellised), but only approaches bramble status in full sun. Fruit high in antioxidants, Cu, Fe, K, Mg, Zn, B vitamins, and vit A, C, E, and K. Both sexes needed for fruit (other blackberry males will work). Has thorns. Fire-resistant. Fall colors. Deer-resistant. Flowers March- June, ripens June- July. Propagated by seed, cuttings, layering, division.

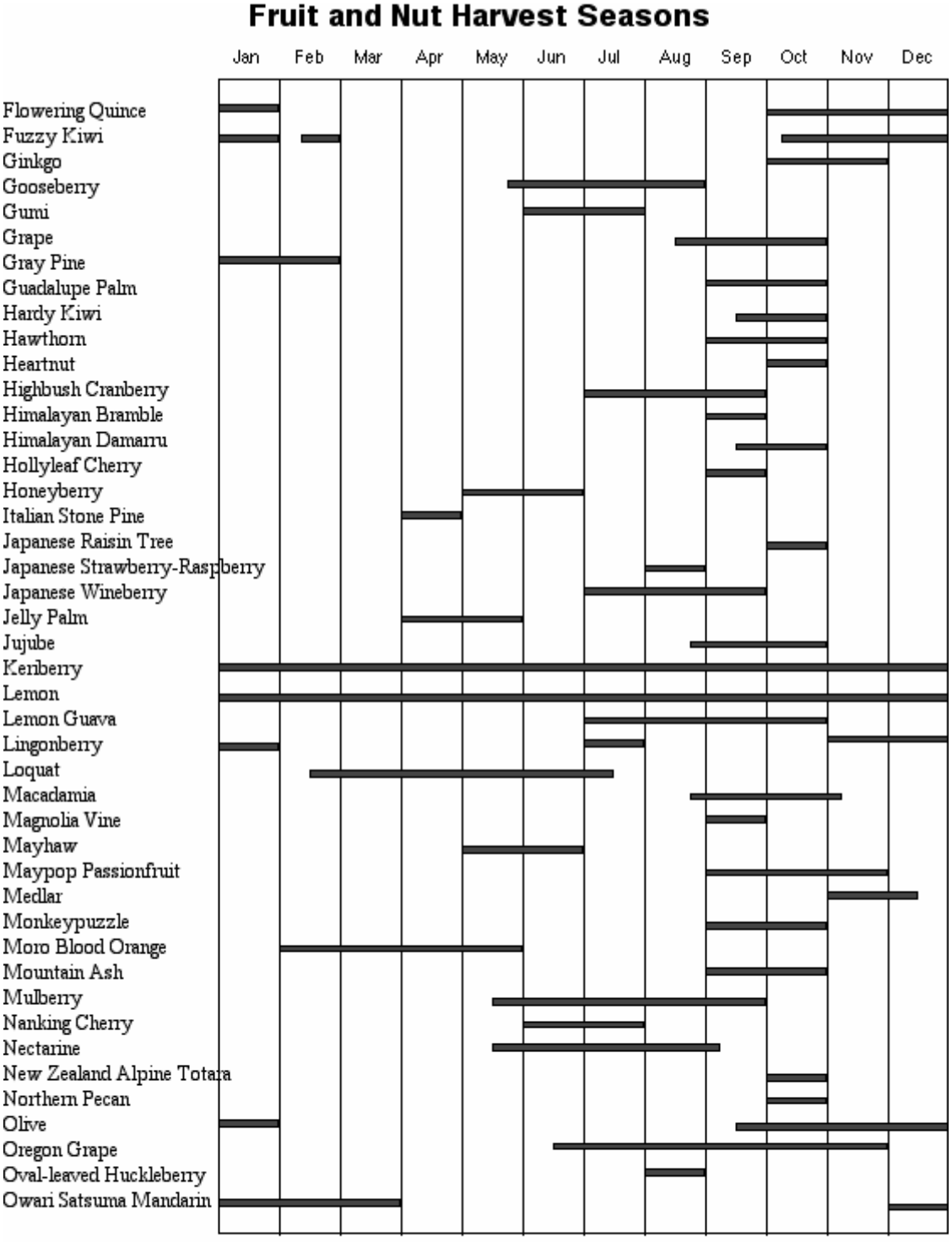


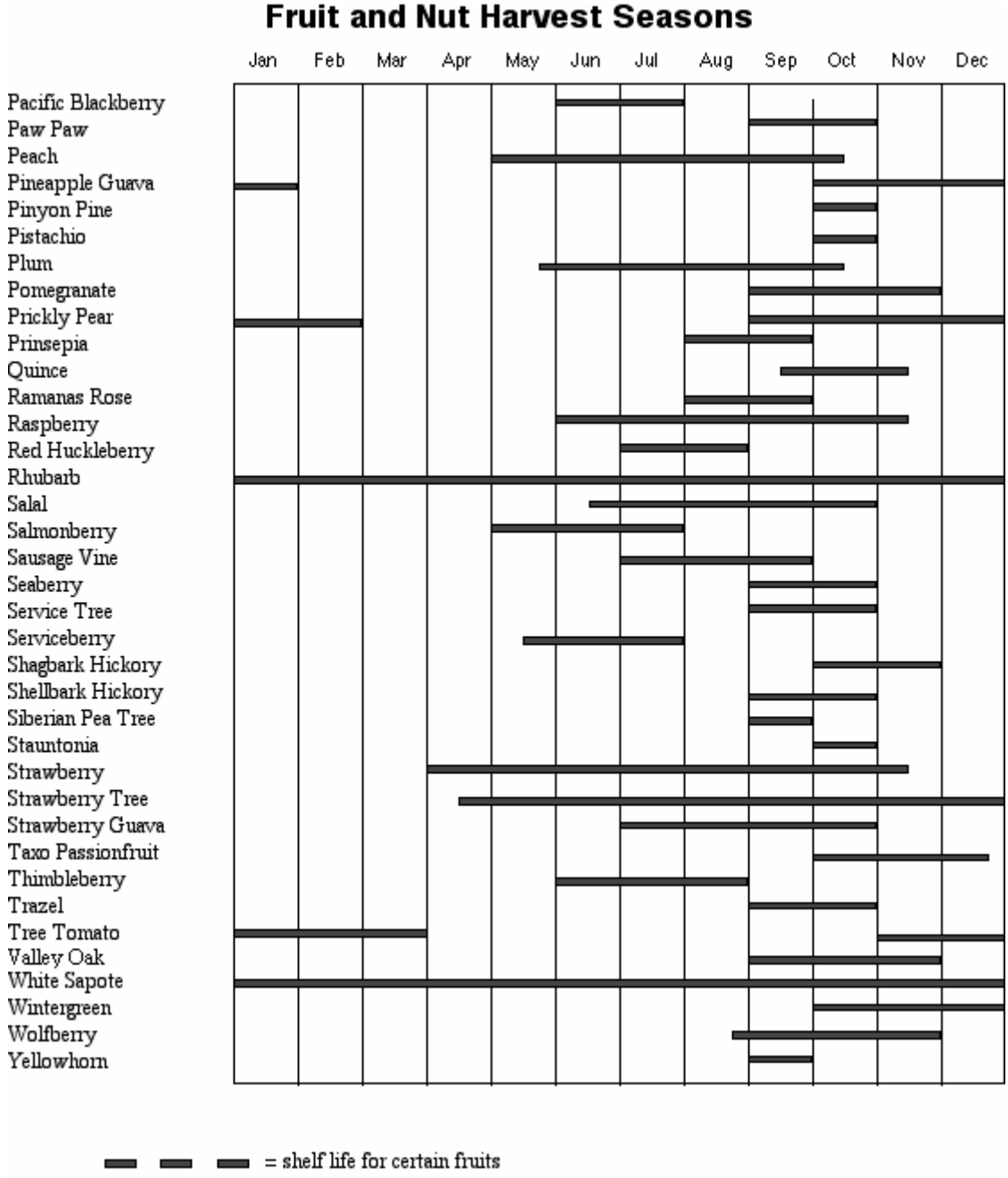

Strawberry (*Fragaria* spp.)- several varieties will produce good fruit in the shade and make a dense groundcover. Fruit is high in Cu, Fe, K, Mg, Mn, B vitamins, vit K, and very high in vit C. Leaves accumulate Fe. Prefer moist, acidic, well-drained soil high in organic matter. Wild strawberry (*F. chiloensis*) is a native that spreads quickly, produces lots of small flavorful fruit (in the sun), and is fire and disease-resistant. Deer-resistant. Flowers March- Nov, ripens April- Nov. Propagated by division.



Wintergreen (*Gaultheria procumbens*)- shade-dependent, evergreen, 6 inch tall creeper spreads 12 inches or more and produces red, wintergreen-flavored berries over a long period. Leaves have the same flavor. Needs moist, acidic soil high in humus. Sensitive to too much sun. Accumulates Mn. Deer-resistant. Flowers July- Aug, ripens Oct- Dec. Propagated from seed, cuttings, division.


Fruit and Nut Harvest Seasons
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Akebia
Almond
Alpine Strawberry
American Persimmon
Apple
Apricot
Arctic Beauty Kiwi
Asian Pear
Asian Persimmon
Autumn Olive
Avocado
Azarole
Babaco Papaya
Black Walnut
Blackberry
Blackcap Raspberry
Blackhaw
Blueberry
Blue Banana Bean
Bunchberry
Bunya Bunya
California Hazelnut
Carob
Chamburro Papaya
Che
Cherry
Chestnut
Chilean Guava
Chilean Wintergreen
Chilean Wine Palm
Chinese Dogwood
Chocolate Berry
Chokeberry
Cornelian Cherry Dogwood
Crabapple
Cranberry
Currant
Elaeagnus X ebbingei
Elderberry
Emerald Creeper
English (Persian) Walnut
European Pear
Evergreen Huckleberry
Fig
Filbert


Fruit and Nut Harvest Seasons
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Flowering Quince
Fuzzy Kiwi
Ginkgo
Gooseberry
Gumi
Grape
Gray Pine
Guadalupe Palm
Hardy Kiwi
Hawthorn
Heartnut
Highbush Cranberry
Himalayan Bramble
Himalayan Damarru
Hollyleaf Cherry
Honeyberry
Italian Stone Pine
Japanese Raisin Tree
Japanese Strawberry-Raspberry
Japanese Wineberry
Jelly Palm
Jujube
Keriberry
Lemon
Lemon Guava
Lingonberry
Loquat
Macadamia
Magnolia Vine
Mayhaw
Maypop Passionfruit
Medlar
Monkeypuzzle
Moro Blood Orange
Mountain Ash
Mulberry
Nanking Cherry
Nectarine
New Zealand Alpine Totara
Northern Pecan
Olive
Oregon Grape
Oval-leaved Huckleberry
Owari Satsuma Mandarin


Fruit and Nut Harvest Seasons
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Pacific Blackberry
Paw Paw
Peach
Pineapple Guava
Pinyon Pine
Pistachio
Plum
Pomegranate
Prickly Pear
Prinsepia
Quince
Ramanas Rose
Raspberry
Red Huckleberry
Rhubarb
Salal
Salmonberry
Sausage Vine
Seaberry
Service Tree
Serviceberry
Shagbark Hickory
Shellbark Hickory
Siberian Pea Tree
Stauntonia
Strawberry
Strawberry Tree
Strawberry Guava
Taxo Passionfruit
Thimbleberry
Trazel
Tree Tomato
Valley Oak
White Sapote
Wintergreen
Wolfberry
Yellowhorn
= shelf life for certain fruits

Plant Characteristics

Evergreen

Tall Trees
Avocado
Bunya Bunya
Chilean Wine Palm
Gray Pine
Guadalupe Palm
Italian Stone Pine
Loquat
Monkeypuzzle
Olive
Pinyon Pine
White Sapote

Short Trees
Banana (in mild climates)
Babaco Papaya
Carob
Chamburro Papaya
Citrus
Jelly Palm
Macadamia
Strawberry Tree

Shrubs
Blueberry
Chilean Guava
Chilean Wintergreen
Chocolate Berry
Elaeagnus X *ebbingei*
Evergreen Huckleberry
Hollyleaf Cherry
Keriberry
Oregon Grape
Pineapple Guava
Prickly Pear
Salal
Strawberry Guava
Tree Tomato

Vines
Akebia (in mild areas)
Himalayan Damarru
Maypop Passionfruit
Sausage Vine
Stauntonia
Taxo Passionfruit

Perennial Vegetables
Alfalfa
Artichoke
Bamboo
Bear's Breech
Campanula
Cardoon
Chicory
Chives
Dandelion
Egyptian Topset Onion
Fennel
Garlic Chives
Garlic Cress
Golden Saxifrage
Good King Henry
Lovage
Mallow
Milkweed
Mitsuba
Nettles
New Zealand Spinach
Nine-star Perennial Broccoli
Perennial Kale
Perpetual Swiss Chard
Plantain
Rocambole
Salt Bush
Seakale
Society Garlic
Sorrel
Tree Collards
Violet
Watercress
Welsh Get Set Red Onion
Yucca

Herbs
Aloe
Bee Balm
Borage
Calendula
California Bay Laurel
Catnip
Chamomile
Chervil
Columbine
Corn Salad
Garlic Mustard
Goldenseal
Hedge Nettle
Lady's Mantle
Lemon Balm
Marigold (depends on species)
Mint
Nasturtium (in warm areas)
Parsley
Pineapple Sage
Rosemary
Sage (in warm areas)
Salad Burnet (in warm areas)
Shungiku (in warm areas)
Soapwort
Sweet Cicely
Sweet Woodruff
Tansy
Tea
Thyme
White Clover
Wild Ginger
Woundwort
Yarrow
Yerba Buena

Groundcovers
Alpine Strawberry
Cranberry
Emerald Creeper
Himalayan Bramble
Lingonberry
New Zealand Dwarf Totara
Pacific Blackberry
Strawberry
Wintergreen

Deciduous

Tall Trees
Almond
American Persimmon
Apple
Asian Pear
Black Walnut
Cherry
Chestnut
English Walnut
European Pear
Fig
Ginkgo
Heartnut
Japanese Raisin Tree
Mayhaw
Mulberry
Northern Pecan
Pistachio
Service Tree
Shagbark Hickory
Shellbark Hickory
Trazel
Valley Oak

Short Trees
Apricot
Asian Persimmon
Azarole
Banana (in cold areas)
Blackhaw
California Hazelnut
Che
Chinese Dogwood
Chinese Haw
Cornelian Cherry Dogwood
Crabapple
Elderberry
Filbert
Hawthorn
Jujube
Medlar
Mountain Ash
Nectarine
Paw Paw
Peach
Plum
Pomegranate
Quince
Siberian Pea Tree
Yellowhorn

Shrubs
Autumn Olive
Black Hawthorn
Blackberry
Blackcap Raspberry
Blueberry
Blue Banana Bean
Chokeberry
Currant
Flowering Quince
Gooseberry
Gumi
Highbush Cranberry
Honeyberry
Nanking Cherry
Oval-leaved Huckleberry
Prinsepia
Ramanas Rose
Raspberry
Red Huckleberry (partially evergreen)
Salmonberry (partially evergreen)
Seaberry
Serviceberry
Thimbleberry
Wolfberry

Vines
Akebia (in most areas)
Arctic Beauty Kiwi
Fuzzy Kiwi
Grape
Hardy Kiwi
Japanese Wineberry
Magnolia Vine

Perennial Vegetables
Arrowleaf Balsamroot
Asparagus
Beach Pea
Bitter Melon
Black Salsify
Canna Lily
Chayote
Comfrey
Daylily
Fragrant Spring Tree
Groundcherry
Groundplum Milkvetch
Hops
Horseradish
Horseradish Tree
Japanese Coltsfoot
Linden
Mashua
Oca
Perennial Buckwheat
Pignut
Potato
Rhubarb (in cold areas)
Runner Bean
Sunchoke
Turkish Rocket
Ulluco
Waterleaf
Yacon
Yam

Herbs
Angelica
Anise Hyssop
Houttuynia
Marigold (depends on species)
Mugwort
Nasturtium (in cold areas)
Purslane
Saffron Crocus
Salad Burnet (in cold areas)
Shungiku (in cold areas)
Tarragon
Valerian

Groundcovers
Bunchberry
Japanese Strawberry-Raspberry

Summer Deciduous

Perennial Vegetables
Artichoke (in drought)
Bear's Breech (in drought)
Chickweed
Cow Parsnip
Daffodil Garlic
Garlic
Ramps

Herbs
Miner's Lettuce

Drought-tolerant

Tall Trees
Almond
American Persimmon
Apple (some)
Asian Pear
Black Walnut
Chestnut
Chilean Wine Palm
English Walnut
European Pear (some)
Fig
Gingko
Gray Pine
Guadalupe Palm
Italian Stone Pine
Loquat
Mayhaw
Mulberry
Olive
Pistachio
Sour Cherry
Trazel
Valley Oak

Short Trees
Apricot (sometimes)
Asian Persimmon
Azarole
California Hazelnut
Carob
Chinese Haw
European Plum
Filbert
Hawthorn
Jelly Palm
Jujube
Macadamia
Nectarine (sometimes)
Peach (sometimes)
Pinyon Pine
Pomegranate
Quince
Siberian Pea Tree
Strawberry Tree

Shrubs
Autumn Olive
Black Hawthorn
Blackberry
Blackcap Raspberry
Chilean Guava
Chokeberry
Elaeagnus X *ebbingei*
Evergreen Huckleberry
Gumi
Highbush Cranberry
Hollyleaf Cherry
Nanking Cherry
Oregon Grape
Pineapple Guava
Prickly Pear
Prinsepia
Ramanas Rose
Red Huckleberry
Salal
Salmonberry
Seaberry
Serviceberry
Thimbleberry
Wolfberry

Vines
Grape
Himalayan Damarru

Perennial Vegetables
Bamboo
Bear's Breech
Chicory
Comfrey
Cow Parsnip
Daffodil Garlic
Dandelion
Daylily
Fennel
Horseradish
Horseradish Tree
Mallow
Plantain
Salt Bush
Seakale
Violet

Herbs
Aloe
Angelica
Columbine
Hedge Nettle
Lemon Balm
Miner's Lettuce
Mint
Mugwort
Rosemary
White Clover
Wild Ginger
Yarrow
Yerba Buena

Groundcovers
Pacific Blackberry

Needs Irrigation

Tall Trees
Avocado (during flowering)
Northern Pecan

Short Trees
Babaco Papaya
Banana
Chamburro Papaya
Chinese Dogwood
Citrus

Shrubs
Blueberry
Chilean Wintergreen

Vines
Arctic Beauty Kiwi
Fuzzy Kiwi
Hardy Kiwi
Magnolia Vine
Taxo Passionfruit

Perennial Vegetables
Artichoke
Bitter Melon
Chayote
Hops
Japanese Coltsfoot
Mashua

Herbs
Bee Balm
Chervil
Sweet Cicely
Tea

Groundcovers
Alpine Strawberry
Blueberry
Cranberry
Lingonberry
Strawberry
Wintergreen

Tolerates Wet Winter Soils Only

Tall Trees
Black Walnut
Shellbark Hickory
Valley Oak

Shrubs
Blueberry
Serviceberry

Groundcovers
Blueberry

Tolerates Wet Soils

Tall Trees
Apple (cooking)
American Persimmon
Asian Pear
European Pear
Mayhaw
Mulberry
Shellbark Hickory
Sour Cherry

Short Trees
Asian Persimmon
Azarole
Banana
Blackhaw
California Hazelnut
Chinese Haw
Crabapple
Elderberry
Filbert
Hawthorn
Pomegranate
Quince

Shrubs
Black Hawthorn
Blackberry
Black Currant
Chokeberry
Evergreen Huckleberry
Highbush Cranberry
Pineapple Guava
Prinsepia
Salmonberry

Vines
Maypop Passionfruit

Perennial Vegetables
Canna Lily
Chicory
Comfrey
Daylily
Golden Saxifrage
Horseradish
Houttuynia
Japanese Coltsfoot
Mitsuba
Nettles
Plantain
Sorrel
Sunchoke
Watercress

Herbs
Mint
Mugwort

Needs Well-drained Soil

Tall Trees
Almond
Avocado
Chestnut
English Walnut
Fig
Gray Pine
Italian Stone Pine
Monkeypuzzle
Northern Pecan
Olive
Pinyon Pine
Pistachio
Sweet Cherry

Short Trees
Apricot
Babaco Papaya
Banana
Carob
Chamburro Papaya
Citrus
Jujube
Macadamia
Mountain Ash
Nectarine
Paw Paw
Peach
Pomegranate
Siberian Pea Tree

Shrubs
Autumn Olive
Blueberry (in Summer)
Chilean Wintergreen
Currant (except black currant)
Elaeagnus X *ebbingei*
Flowering Quince
Gumi
Nanking Cherry
Oval-leaved Huckleberry
Pineapple Guava
Prickly Pear
Raspberry
Red Huckleberry
Seaberry
Strawberry Guava
Tree Tomato
Wolfberry

Vines
Akebia
Arctic Beauty Kiwi
Fuzzy Kiwi
Grape
Hardy Kiwi
Japanese Wineberry
Magnolia Vine
Sausage Vine
Stauntonia

Perennial Vegetables
Alfalfa
Asparagus
Beach Pea
Chayote
Groundplum Milkvetch
Hops
Horseradish Tree
Milkweed
Salt Bush
Seakale

Herbs
Chervil
Goldenseal
Tea

Groundcovers
Cranberry
Lingonberry
Strawberry

Tolerates Heavy Soil

Tall Trees
American Persimmon
Apple (some)
Asian Pear
Black Walnut
English Walnut
European Pear
Fig
Ginkgo
Japanese Raisin Tree
Mayhaw
Service Tree
Shagbark Hickory
Sour Cherry
Valley Oak

Short Trees
Asian Persimmon
Azarole
Black Hawthorn
Blackhaw
California Hazelnut
Chinese Dogwood
Chinese Haw
Cornelian Cherry Dogwood
Elderberry
European Plum
Hawthorn
Jujube
Pawpaw
Pomegranate
Strawberry Tree

Shrubs
Autumn Olive
Blue Banana Bean
Chokeberry
Currant
Elaeagnus X *ebbingei*
Flowering Quince
Gooseberry
Gumi
Highbush Cranberry
Oregon Grape
Ramanas Rose
Serviceberry

Vines
Maypop Passionfruit

Perennial Vegetables
Comfrey
Dandelion
Daylily
Horseradish
Horseradish Tree
Perennial Buckwheat
Plantain
Potato
Rhubarb

Herbs
Borage
Chickweed
Columbine
Lady's Mantle
Lemon Balm
Mint
Mugwort
Saffron Crocus
Salad Burnet
Shungiku
Thyme
Valerian
White Clover
Yerba Buena

Groundcovers
Alpine Strawberry
Bunchberry

Prefers Acidic Soils

Tall Trees
Chestnut
Loquat

Short Trees
Banana
Citrus
Pinyon Pine

Shrubs
Blueberry
Chilean Wintergreen
Oval-leaved Huckleberry
Pineapple Guava
Raspberry
Red Huckleberry
Salal

Vines
Fuzzy Kiwi

Perennial Vegetables
Chicory
Potato
Rhubarb

Herbs
Angelica

Groundcovers
Alpine Strawberry
Blueberry
Bunchberry
Cranberry
Lingonberry
Strawberry
Wintergreen

Tolerates Acidic Soils

Tall Trees
Black Walnut
English Walnut
Fig
Ginkgo
Japanese Raisin Tree
Mayhaw

Short Trees
Blackhaw
Hawthorn
Pomegranate
Strawberry Tree

Shrubs
Evergreen Huckleberry
Salmonberry

Vines
Akebia

Perennial Vegetables
Golden Saxifrage
Horseradish Tree

Herbs
White Clover

Prefers Basic Soils

Tall Trees
Almond
Black Walnut
Heartnut

Shrubs
Wolfberry

Perennial Vegetables
Alfalfa
Asparagus
Perpetual Swiss Chard
Seakale

Herbs
Sweet Woodruff

Tolerates Basic Soils

Tall Trees
English Walnut
Fig
Ginkgo
Guadalupe Palm
Hickory
Italian Stone Pine
Japanese Raisin Tree
Mayhaw
Trazel

Short Trees
Apricot
Azarole
Blackhaw
California Hazelnut
Chinese Haw
Cornelian Cherry
Dogwood
Elderberry
Filbert
Hawthorn
Jujube
Mountain Ash
Pomegranate
Siberian Pea Tree
Strawberry Tree
Yellowhorn

Shrubs
Blackberry
Highbush Cranberry
Hollyleaf Cherry
Nanking Cherry

Vines
Akebia

Perennial Vegetables
Fragrant Spring Tree
Garlic Mustard
Horseradish Tree
Perennial Kale
Pignut
Salt Bush

Groundcovers
Alpine Strawberry

Needs Sun

Tall Trees
Almond
Avocado
Cherry
Chilean Wine Palm
Fig
Gray Pine
Guadalupe Palm
Hickory
Italian Stone Pine
Northern Pecan
Olive
Pinyon Pine
Pistachio
White Sapote

Short Trees
Apricot
Banana
Chamburro Papaya
Che
Citrus
Jujube
Macadamia
Nectarine
Peach
Pomegranate
Quince
Siberian Pea Tree

Shrubs
Blueberry (except at really hot sites)
Prickly Pear
Raspberry (in cool areas)
Strawberry Guava
Tree Tomato
Wolfberry

Vines
Grape

Perennial Vegetables
Asparagus
Beach Pea
Bitter Melon
Canna Lily
Chayote
Groundcherry
Salt Bush
Yam

Needs Shade

Short Trees
California Hazelnut (in hot climates)
Filbert (in hot climates)
Paw Paw (when young)

Shrubs
Blueberry (at hot sites)
Blue Banana Bean
Honeyberry
Raspberry (in hot areas)

Vines
Akebia
Arctic Beauty Kiwi
Hardy Kiwi (in hot areas)
Magnolia Vine
Sausage Vine

Herbs
Corn Salad (in Summer)
Tea (in hot areas)

Groundcovers
Bunchberry
Wintergreen

Tolerates Partial Shade Only

Tall Trees
Apple
Asian Pear
European Pear
Fig (only in hot areas)
Japanese Raisin Tree
Loquat
Mayhaw
Mulberry
Trazel

Short Trees
Asian Persimmon
Azarole
Babaco Papaya
Chinese Dogwood
Chinese Haw
Cornelian Cherry
Dogwood
Elderberry
Filbert
Hawthorn
Jelly Palm
Medlar
Mountain Ash
Strawberry Tree

Yellowhorn

Shrubs
Autumn Olive
Black Hawthorn
Blackberry
Blackcap Raspberry
Chilean Guava
Chilean Wintergreen
Chocolate Berry
Flowering Quince
Highbush Cranberry
Hollyleaf Cherry
Nanking Cherry
Oval-leaved Huckleberry
Pineapple Guava (in warm areas)
Prinsepia
Ramanas Rose
Seaberry
Thimbleberry

Vines
Akebia
Hardy Kiwi

Perennial Vegetables
Black Salsify
Campanula
Canna lily
Chicory
Chives
Daffodil Garlic
Dandelion
Daylily
Fennel
Garlic Chives
Golden Saxifrage
Good King Henry
Groundplum Milkvetch
Horseradish
Linden
Lovage
Mallow
Mashua
Mitsuba
New Zealand Spinach
Nine-star Perennial Broccoli
Oca
Perennial Buckwheat
Perpetual Swiss Chard
Pignut
Potato
Rhubarb
Seakale
Society Garlic
Sorrel
Sunchoke
Tree Collards
Yacon

Herbs
see Plant Profiles list

Tolerates Full Shade

Tall Trees
American Persimmon
Bunya Bunya
Ginkgo
Service Tree

Short Trees
Blackhaw
California Hazelnut
Pawpaw

Shrubs
Blue Banana Bean
Chokeberry
Currant
Elaeagnus X *ebbingei*
Evergreen Huckleberry
Gooseberry
Gumi
Honeyberry
Oregon Grape
Red Huckleberry
Salal
Salmonberry
Serviceberry

Vines
Arctic Beauty Kiwi
Himalayan Damarru
Japanese Wineberry
Magnolia Vine
Sausage Vine
Stauntonia

Perennial Vegetables
Bear's Breech
Comfrey
Japanese Coltsfoot
Miner’s Lettuce
Nettles
Ramps
Violet
Waterleaf

Herbs
California Bay Laurel
Garlic Mustard
Miner's Lettuce
Sweet Woodruff
Wild Ginger

Groundcovers
Alpine Strawberry
Bunchberry
Emerald Creeper
Himalayan Bramble
Japanese Strawberry-Raspberry
Lingonberry
Strawberry
Wintergreen

Casts Light Shade

Tall Trees
Bunya Bunya
Chilean Wine Palm
Ginkgo
Gray Pine
Guadalupe Palm
Monkeypuzzle
Valley Oak

Short Trees
Babaco Papaya
Chamburro Papaya
Elderberry
Jujube
Mountain Ash
Pinyon Pine
Siberian Pea Tree
Yellowhorn

Shrubs
Blackcap Raspberry
Blue Banana Bean
Oregon Grape
Raspberry
Salmonberry
Seaberry

Loves High Temperatures

Tall Trees
Almond
Avocado
Black Walnut
Fig
Hickory
Mulberry
Olive
Pecan
Pistachio
Sapote

Short Trees
Banana
Citrus
Jujube
Nectarine
Peach
Pomegranate

Shrubs
Pineapple Guava

Vines
Grape
Taxo Passionfruit

Perennial Vegetables
Horseradish Tree

Needs Warmth

Tall Trees
Almond
Fig (in north)
Northern Pecan
Pistachio

Short Tree
Apricot
Babaco Papaya
Banana
Che
Citrus
Jujube
Macadamia
Nectarine
Paw Paw (in coastal areas)
Pomegranate

Shrubs
Tree Tomato

Vines
Akebia
Grape

Perennial Vegetables
Chayote
Groundcherry
Horseradish Tree

Needs Dry Air

Tall Trees
Almond
Olive
Pistachio

Short Trees
Apricot
Carob (for fruit)
Siberian Pea Tree

Needs Humid Air

Vines
Akebia

Short Trees
Babaco Papaya

Salt-tolerant

Tall Trees
Bunya Bunya
Monkeypuzzle
Guadalupe Palm
Loquat

Short Trees
Elderberry
Jujube
Siberian Pea Tree

Shrubs
Autumn Olive
Elaeagnus X *ebbingei*
Gumi
Pineapple Guava
Ramanas Rose
Salal
Seaberry

Perennial Vegetables
Beach Pea
New Zealand Spinach
Salt Bush
Seakale

Wind-tolerant

Tall Trees
Black Walnut
Chilean Wine Palm
Fig
Guadalupe Palm
Loquat
Mayhaw
Mulberry
Shagbark Hickory
Trazel
Valley Oak

Short Trees
Azarole
Carob
California Hazelnut
Cornelian Cherry
Dogwood
European Plum
Hawthorn
Highbush Cranberry
Jelly Palm
Medlar
Mountain Ash
Siberian Pea Tree
Strawberry Tree

Shrubs
Black Hawthorn
Chilean Guava
Elaeagnus X *ebbingei*
Gumi
Salal

Hates Wind

Tall Trees
Almond
Avocado
Ginkgo

Short Trees
Babaco Papaya
Banana
Macadamia
Quince

Shrubs
Blue Banana Bean
Oval-leaved Huckleberry
Tree Tomato

Vines
Japanese Wineberry
Stauntonia

Perennial Vegetables
Chayote

Needs Fertilizer

Tall Trees
Avocado
White Sapote

Short Trees
Babaco Papaya
Banana
Chamburro Papaya
Citrus

Shrubs
Raspberry

Vines
Arctic Beauty Kiwi
Fuzzy Kiwi
Hardy Kiwi

Perennial Vegetables
Bitter Melon
Chayote

Fertilizer Unnecessary

Tall Trees
Fig
Mulberry
Valley Oak

Short Trees
Siberian Pea Tree

Shrubs
Autumn Olive
Elaeagnus X *ebbingei*
Evergreen Huckleberry
Gumi
Seaberry

Perennial Vegetables
Chicory
Comfrey
White Clover

Nitrogen-fixer

Short Trees
Siberian Pea Tree

Shrubs
Autumn Olive
Elaeagnus X *ebbinge*i
Gumi
Seaberry

Perennial Vegetables
Alfalfa
Beach Pea
Groundplum Milkvetch
White Clover

Damaged by Late Frosts

Tall Trees
Almond
English Walnut

Short Trees
Apricot
Nectarine
Peach

Shrubs
Blue Banana Bean
Chilean Guava

Vines
Akebia
Fuzzy Kiwi
Hardy Kiwi
Magnolia Vine
Stauntonia

Perennial Vegetables
Fragrant Spring Tree

Needs Lots of Organic Matter

Short Trees
Banana
Paw Paw

Shrubs
Blueberry
Oval-leaved Huckleberry
Raspberry
Red Huckleberry

Perennial Vegetables
Bamboo
Ramps

Herbs
Goldenseal
Tea

Groundcovers
Alpine Strawberry
Blueberry
Bunchberry
Lingonberry
Strawberry
Wintergreen

Makes Lots of Organic Matter

Shrubs
Elaeagnus spp.

Perennial Vegetables
Alfalfa
Artichoke
Bamboo
Canna Lily
Cardoon
Chayote
Chicory
Comfrey
Cow Parsnip
Fennel
Groundcherry
Hops
Horseradish
Japanese Coltsfoot
Nettles
Potato
Rhubarb
Sunchoke
Yacon

Herbs
Angelica
Borage
Mugwort

Pineapple Sage
Valerian
White Clover

Less than 400 Hours Chill Varieties Available

Tall Trees
Almond
American Persimmon
Apple
Asian Pear
Avocado (all)
Black Walnut
Bunya Bunya (all)
Chestnut
Chilean Wine Palm (all)
English Walnut
European Pear
Fig (all)
Ginkgo
Guadalupe Palm (all)
Italian Stone Pine (all)
Loquat (all)
Monkeypuzzle (all)
Mulberry
Olive (all)
Pecan
Valley Oak (all)
White Sapote (all)

Short Trees
Apricot
Asian Persimmon (all)
Azarole
Babaco Papaya (all)
Banana (all)
Carob (all)
Chamburro Papaya (all)
Citrus (all)
Crabapple
Elderberry (Blue)
Jelly Palm (all)
Jujube (all)
Macadamia (all)
Nectarine
Peach
Pinyon Pine
Plum
Pomegranate (all)
Quince
Strawberry Tree

Shrubs
Blueberry
Blackberry
Raspberry
Strawberry

Vines
Fuzzy Kiwi
Grape

Fire-resistant

Tall Trees
Almond (somewhat)
Apple (somewhat)
Asian pear (somewhat)
Avocado
Black Walnut
Cherry (somewhat)
English Walnut
Ginkgo
Heartnut
Olive
Service Tree
Valley Oak
White Sapote

Short Trees
Apricot (somewhat)
Carob
Citrus
Crabapple (somewhat)
Macadamia
Mountain Ash
Nectarine (somewhat)
Peach (somewhat)
Plum (somewhat)
Pomegranate
Strawberry Tree

Shrubs
Autumn Olive (probably)
Blackberry
Blackcap Raspberry
Currant
Elaeagnus X *ebbingei* (probably)
Gooseberry
Gumi (probably)
Hollyleaf Cherry
Honeyberry
Nanking Cherry (somewhat)
Oregon Grape
Pineapple Guava
Prickly Pear
Ramanas Rose
Raspberry
Salal
Salmonberry
Serviceberry
Thimbleberry

Vines
Keriberry
Japanese Wineberry

Perennial Vegetables
Alfalfa
Chives
Comfrey
Day Lily
Golden Saxifrage
New Zealand Spinach
Rhubarb
Saltbush
Society Garlic
Yucca

Herbs
Aloe
Columbine
Pineapple Sage
Purslane
Rosemary
Sage
Sweet Woodruff
Thyme
Wild Ginger
Yarrow

Groundcovers
Emerald Carpet
Himalayan Bramble
Japanese Strawberry-Raspberry
Pacific Blackberry
Wild Strawberry

Insectary

Shrubs
Ramanas Rose

Perennial Vegetables
Alfalfa
Artichoke
Campanula
Cardoon
Chicory
Chives
Comfrey
Cow Parsnip
Dandelion
Fennel
Good King Henry
Hops
Linden
Lovage
Mallow
Milkweed
Mitsuba
Perennial Buckwheat
Sunchoke
Turkish Rocket

Herbs
Angelica
Anise Hyssop
Bee Balm
Borage
Calendula
Chamomile
Columbine
Lemon Balm
Marigold
Mint
Mugwort
Nasturtium
Parsley
Pineapple Sage
Rosemary
Sage
Shungiku
Soapwort
Sweet Cicely
Tansy
Tarragon
Thyme

Disease-resistant

Tall Trees
American Persimmon
Black Walnut
Fig
Gray Pine
Italian Stone Pine
Japanese Raisin Tree
Mulberry
Northern Pecan
Olive
Pistachio
Valley Oak
White Sapote

Short Trees
Asian Persimmon
Blackhaw
California Hazelnut
Carob
Chinese Dogwood
Crabapple
Elderberry
Hawthorn
Jujube
Medlar
Mountain Ash
Paw Paw
Pinyon Pine
Pomegranate
Quince
Siberian Pea Tree
Strawberry Tree

Shrubs
Blueberry
Chilean Guava
Chokeberry

Elaeagnus spp.
Highbush Cranberry
Lemon Guava
Nanking Cherry
Oregon Grape
Pineapple Guava
Prickly Pear
Ramanas Rose
Salal
Seaberry
Strawberry Guava

Vines
Kiwis
Maypop

Groundcovers
Alpine Strawberry
Strawberry (wild)

Resistant to Oak Root Fungus

Tall Trees
American Persimmon
Apple
Avocado
Black Walnut (California)
Chestnut
European Pear
Fig
Ginkgo
Hickory
Mayhaw
Mulberry
Pecan
Valley Oak

Short Trees
Asian Persimmon
Azarole
Carob
Chinese Dogwood
Chinese Haw
Cornelian Cherry Dogwood
Crabapple
Elderberry
Hawthorn
Macadamia
Plum (Japanese)
Pomegranate

Shrubs
Autumn Olive
Black Hawthorn
Blueberry
Chilean Guava
Chilean Wintergreen
Chokeberry
Elaeagnus X *ebbingei*
Evergreen Huckleberry
Flowering Quince
Gumi
Hollyleaf Cherry
Honeyberry
Lemon Guava
Oregon Grape
Oval-leaved Huckleberry
Red Huckleberry
Salal
Seaberry
Strawberry Guava

Vines
Akebia
Arctic Beauty Kiwi
Fuzzy Kiwi
Hardy Kiwi
Maypop Passionfruit
Taxo Passionfruit

Perennial Vegetables
Bamboo
Linden

Susceptible to Oak Root Fungus

Tall Trees
Almond
Cherry
English Walnut
Gray Pine
Italian Stone Pine
Monkeypuzzle
Pistachio

Short Trees
Apricot
Nectarine
Peach
Pinyon Pine
Plum (except Japanese)
Strawberry Tree

Shrubs
Blackberry
Blackcap Raspberry
Currants
Gooseberry
Nanking Cherry
Ramanas Rose
Raspberry
Salmonberry
Thimbleberry

Vines
Grape
Japanese Wineberry
Keriberry

Herbs
California Bay Laurel

Deer-resistant

Tall Trees
American Persimmon
Bunya Bunya
Chilean Wine Palm
Fig
Gingko
Gray Pine
Guadalupe Palm
Italian Stone Pine
Monkeypuzzle
Olive
Pistachio

Short Trees
Carob
Hardy Citrus
Jelly Palm
Macadamia
Meyer Lemon
Moro Blood Orange
Owari Satsuma Mandarin
Pinyon Pine
Strawberry Tree

Shrubs
Elaeagnus X *ebbingei*
Flowering Quince
Hollyleaf Cherry
Lemon Guava
Oregon Grape
Pineapple Guava
Prickly Pear
Ramanas Rose
Salal
Seaberry
Strawberry Guava

Vines
Fuzzy Kiwi
Himalayan Damarru

Perennial Vegetables
Artichoke
Bamboo
Bear's Breech
Cardoon
Comfrey
Daffodil Garlic
Dandelion
Day Lily
Fennel
Garlic
Golden Saxifrage
Horseradish
Nettles
New Zealand Spinach
Plantain
Rhubarb
Society Garlic
Sorrel
Sunchoke
Violet
Yucca

Herbs
Aloe
Bee Balm
Calendula
California Bay Laurel
Chamomile
Columbine
Hedge Nettle
Lemon Balm
Mint
Mugwort
Oregano
Pineapple Sage
Purslane
Rosemary
Saffron Crocus
Sage
Salad Burnet
Sweet Woodruff
Tansy
Tea
Thyme
White Clover
Wild Ginger
Yarrow
Yerba Buena

Groundcovers
Alpine Totara
Emerald Carpet
Himalayan Bramble
Lingonberry
Pacific Blackberry
Strawberry
Wintergreen

Native

Tall Trees
Gray Pine
Valley Oak

Short Trees
California Hazelnut
Crabapple (Pacific)
Elderberry (Blue)
Plum (Klamath)

Shrubs
Black Hawthorn
Blackcap Raspberry
Currant (some)

Evergreen Huckleberry
Gooseberry (some)
Hollyleaf Cherry
Oregon Grape
Oval-leaved Huckleberry
Red Huckleberry
Salal
Salmonberry
Serviceberry
Thimbleberry

Perennial Vegetables
Arrowleaf Balsamroot
Beach Pea
Cow Parsnip
Golden Saxifrage
Milkweed
Nettles
Violet (some)
Waterleaf

Herbs
Angelica
California Bay Laurel
Chickweed
Columbine
Hedge Nettle
Miner's Lettuce
Mugwort
Wild Ginger
Yarrow
Yerba Buena

Groundcovers
Blueberry (some)
Bunchberry
Pacific Blackberry
Strawberry (some)

Non-Native Mediterranean Climate

Tall Trees
Almond
Apple (some)
Chestnut
Chilean Wine Palm
English Walnut
European Pear
Fig
Guadalupe Palm
Italian Stone Pine
Monkeypuzzle
Olive
Persian Mulberry
Pistachio
Sour Cherry
Trazel

Short Trees
Azarole
Carob
European Plum
Medlar
Mountain Ash
Pinyon Pine
Pomegranate
Quince
Strawberry Tree

Shrubs
Boxwood
Chilean Guava

Vines
Grape

Perennial Vegetables
Alfalfa
Artichoke
Asparagus
Bear's Breech
Black Salsify
Campanula (some)
Cardoon
Chicory
Chives
Comfrey
Daffodil Garlic
Dandelion
Fennel
Hops
Horseradish
Lovage
Mallow
Pignut
Plantain
Salt Bush
Seakale
Society Garlic
Sorrel
Turkish Rocket
Watercress

Herbs
Borage
Calendula
Catnip
Chamomile
Chervil
Corn Salad
Garlic Mustard
Lady's Mantle
Lemon Balm
Marigold (some)
Mint
Parsley
Rosemary
Saffron Crocus
Sage
Salad Burnet
Soapwort
Sweet Cicely
Sweet Woodruff
Tansy
Tarragon
Thyme
Valerian
White Clover

Pretty Fall Foliage

Tall Trees
American Persimmon
Apple (some)
Cherry
Chestnut
English Walnut
European Pear (some)
Fig
Ginkgo
Hickory
Mulberry
Pistachio

Short Trees
Apricot
Asian Pear
Asian Persimmon
Blackhaw
California Hazelnut
Che
Chinese Dogwood
Chinese Haw
Cornelian Cherry
Dogwood
Filbert
Jujube
Medlar
Mountain Ash
Nectarine
Paw Paw
Peach
Plum (some)
Pomegranate

Shrubs
Black Hawthorn
Blueberry
Chokeberry
Evergreen Huckleberry
Highbush Cranberry
Ramanas Rose
Red Huckleberry
Serviceberry

Vines
Akebia
Grape (some)

Perennial Vegetables
Linden
Tree Collards

Groundcovers
Blueberry
Bunchberry
Cranberry
Emerald Carpet
Pacific Blackberry

Appendix: An Introduction to Permaculture

Permaculture is a design system for the creation of sustainable humun ecosystems. First formulated by Bill Mollison and David Holmgren of Tasmania in 1974, it has been put into practice around the world and has developed many faces. Permaculture can be applied to sustainable farming, energy systems, technologies, water management, financial and government systems, and even spirituality. The basic goal of Permaculture is to create sustainable self-organizing systems by cycling nutrients, energy, water, money, and information within the system, minimizing inputs and aligning each element so that it is in harmony with the whole. Permaculturists learn and utilize examples from wild Nature and primal cultures, as well as from industrial culture.

The core of Permaculture consists of a set of ethics and principles, plus the Zone and Sector Analysis design strategy. These are what make a Permaculture design a Permaculture design. However, the field is very broad and people who are serious about studying Permaculture usually take a two-week design course. For more information about Permaculture and Permaculture courses see **Permaculture Resources** at the end of the book. The following design guidelines have been compiled by innumerable Permaculture activists and is only partly the work of myself.

Permaculture Ethics and Principles

Ethics

Care of Earth- includes all living and non-living things- plants, animals, land, water and air.

Care of People- promote self-reliance, access to resources necessary for existence, and community responsibility.

Setting Limits to Population & Consumption- limit your ecological footprint so that you can contribute surplus time, space, labor, money, information, materials, and energy to achieve the aims of Earth and people care.

Permaculture also acknowledges a basic life ethic, which recognizes the intrinsic worth of every living thing (deep ecology). A tree has value in itself, even if it presents no commercial value to humuns.

Set of Ethics on Wild Systems:
*Implacable and uncompromising opposition to further disturbance of any remaining natural forests (or other wilderness);
*Vigorous rehabilitation of degraded and damaged wild systems to a stable state.
*Establishment of plant systems for our own use on the least amount of land we can use for our existence; and
*Establishment of plant and animal refuges for rare or threatened species.
*Type 1 Error: When we settle into wilderness, we are in conflict with so many lifeforms that we have to destroy them to exist. Keep out of the bush. It is already in good order.

Principles of Permaculture

Observation- Practice protracted & thoughtful observation rather than protracted and thoughtless labor. Notice changes through all four seasons. Nature is more complex than we will ever be able to comprehend. Practice "don't know mind"- be open to new information.

Work With Nature- Aiding the wild cycles results in higher yields and less work. A little support goes a long way. Observe and replicate wild patterns.

Everything is Connected to Everything Else- Recognize the functional relationships between elements. Every event we can detect is a result of preceding events, and gives rise to subsequent events (karma). Everything gardens. Don't use chemicals or bio-engineered organisms the system didn't evolve with.

Relative Location- Components placed in a system are viewed in relationship, not in isolation. Create functional relationships between components. The purpose of a functional and self-regulating design is to place elements or components in such a way that each serves the needs, and accepts the products, of other elements (see **Sectors**). Design for time-efficiency (see **Zones)**.

Every Function is Supported by Many Elements - Redundancy. Good design ensures that all important functions can withstand the failure of one or more element.

Every Element is Supported by Many Functions- Each element we include is part of a system, chosen and placed so that it performs as many functions as possible. Stack functions.

Diversity -As a general rule, as sustainable systems mature they become increasingly diverse in both space and time. What is important is the complexity of the functional relationships that exist between elements, not the number of elements. Diverse functional connections create stability. Use guilds (units of mutually-supporting elements).

Edge Effect- Ecotones are often the most diverse and fertile areas in a system. Two ecosystems can come together to form a third which has more diversity than either of the other two, i.e. edges of ponds, forests, meadows, currents, etc. However, edge should be minimized for species that need interior conditions or where outer influences (i.e. 'weeds') are negative.
*The creation of complex boundary conditions is a basic design strategy for creating spatial and temporal niches.
*Place an intervening, mutually-compatible component between two incompatible systems.
*Select and place components so that incompatibility is nullified, interdependence maximized.
*Stupidity is an attempt to iron out all creative differences, and not to use or value them creatively.

Use Onsite or Local Resources- Determine what resources are available and entering the system on their own and maximize their use rather than import resources. Utilize local knowledge. Each site is unique, so designs should be site-specific.

Use Biological Resources- Living things reproduce and build-up their availability over time, assisted by their interaction with other compatible elements. Use and reserve biological intelligence. Discover the inherent intelligence of each organism (entelechy).

Law of Return- Whatever we take, we must return. Continuation of life depends on the maintenance of the global biogeochemical cycles of essential elements, in particular carbon, oxygen, nitrogen, sulfur, and phosphorus. One calorie in/one calorie out- do not consume or export more biomass than carbon fixed by the solar budget. Use renewable or recyclable materials. Use renewable sources of energy.

Stocking- Find the balance of various elements to keep one from overpowering another over time. How much of an element needs to be produced in order to fulfill the needs of the whole system?

Succession- Recognize that certain elements prepare the way for systems to support other elements in the future, i.e. succession planting. Work in the dimension of time: use seral stages to advantage. Long-term planning.

Hold Water and Fertility as High on the Landscape as Possible- Make use of and cycle water, nutrients, and energy at each opportunity, preventing them from leaving the system as long as possible.

Energy Conservation and Recycling- Yields from a system are designed to supply on-site needs and/or needs of the local region. Reduce waste. Catch, store, use, and cycle energy before it degrades. Use gravity to advantage. Consider the embedded energy of inputs. We can use energy to construct systems, providing that in their lifetime, they store or conserve more energy than we use to construct them or to maintain them.

Small- Scale Intensive Systems- Start small and create a system that is manageable and produces a high yield. Stack plants vertically to maximize use of solar energy and space- think vertically.

Local Focus- "Think globally - act locally." Grow your own food, cooperate with neighbors. Community efficiency not self-sufficiency. Eat a bioregional diet. Support local culture.

Make the Least Change for the Greatest Effect- The less change that is generated, the less embedded energy is used to create the system and the less disturbance to wild Nature.

Turn Stress into Harmony- Stress here may be defined as either prevention of natural function, or of forced function. Harmony may be defined as the integration of chosen and natural functions, and the easy supply of essential needs.

Principle of Disorder- Order and harmony produce energy for other uses. Disorder consumes energy to no useful end. Tidiness is maintained disorder. Any system or organism can accept only that quantity of a resource which can be used productively. Any resource input beyond that point throws the system or organism into disorder; oversupply of a resource is a form of chronic pollution.

Metastability- For a complex system to remain stable, there must be small pockets of disorder. Design for flux, pulses, catastrophes, and change.

The Yield of a System is Theoretically Unlimited- The only limit on the number of uses of a resource possible is the limit of information and imagination of the designer. System yield is the sum total of surplus energy produced by, stored, conserved,

reused, or converted by the design. Energy is in surplus once the system itself has available all its needs for growth, reproduction and maintenance. Unused surplus results in pollution and more work.

Planting Strategy- 1st-natives, 2nd-proven exotics, 3rd-unproven exotics -carefully on a small scale with lots of observation.

Dispersal of Food Yield Over Time:
*By selection of early, mid, and late season varieties.
*By planting the same variety in early or late-ripening situations.
*By selection of long-yielding varieties.
*By a general increase in diversity in the system so that leaf, fruit, seed, and root are all product yields.
*By using self-storing species such as tubers, hard seeds, fuelwood, or rhizomes which can be "cropped on demand."
*By techniques such as preserving, drying, pitting, and cool storage.
*By regional trade between communities, or by the utilization of land at different altitudes or latitudes.

A Policy of Responsibility (to Relinquish Power)- The role of beneficial authority is to return function and responsibility to life and to people; if successful, no further authority is needed. The role of successful design is to create a self-managed system.

Chaos- Chaos has form, but is not predictable. Similar initial conditions may create divergent effects. Small fluctuations may be amplified. Thresholds can lead to vastly different dynamics. In chaos lies unparalleled opportunity for imposing creative order.

Pay Attention to Scale- What may be appropriate at one scale may not be at another. Small is beautiful.

Wait One Year- It is very advantageous to see a site through all the seasons before making any changes. Time allows new information to arise, and synthesis of the old.

Appropriate Technology- These same principles apply to cooking, lighting, transportation, heating, sewage treatment, water, and other utilities. Consider the impact of technologies, both in their use and in their production.

Mistakes are Tools for Learning- Learning about what doesn't work leads you to what does work.

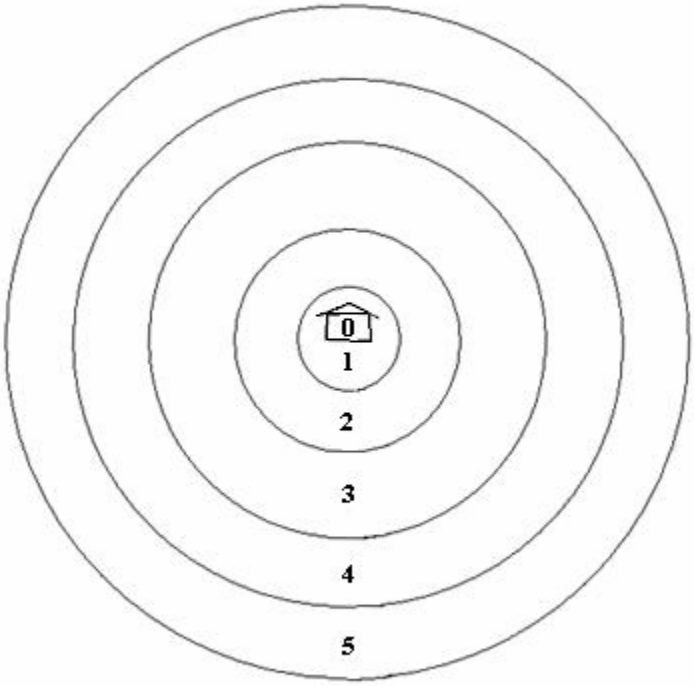
The Problem is the Solution- We are the problem, we are the solution. Turn waste into resources and constraints into assets. We are surrounded by insurmountable opportunities!

Zone and Sector Analysis

Zone and Sector Analysis is used for creating energy-conserving designs which take into consideration the energy flows of the area being designed for. Zones describe patterns of use and relative placement of elements by occupants. Sectors describe pre-existing energy flows through the site. Both can be applied at any scale, from a kitchen to the planet.

Zones

Zones are based on how much we use or need to maintain the various elements we want in a design. The goal is to conserve humun and other energy, minimize inputs, cycle energy and nutrients, maximize yields, and minimize maintenance. As an ideal, zones are a series of concentric circles radiating out from the center, which on a homesite would be the house. The placement of an element in the different zones is dependent on the number of times per year which you visit it: the more attention an element needs, the closer to home it should be. Realistically, the shape of Zones is determined by topography, property boundaries, existing structures, and consideration of Sectors.



Zone 0- The home or village, usually consisting of the house and the personal lifestyles and psycho-spirituality of the people that live there. This Zone is nearly always occupied and all of the daily needs should be satisfied here. The patterns in this Zone affect all other Zones (and the rest of the world).

Zone 1- Elements requiring continual observation, maintenance, and use are placed here. This includes the vegetable garden, dwarf fruit trees, greenhouse, nursery, storage areas and workshop, root cellar, housing for small animals, and culinary herbs. Techniques and technologies include solar energy systems, rainwater catchment, graywater systems, composting toilets, compost bins, fully mulched and pruned gardens, groundcovers, vertical stacking of plants, and keyhole beds. This is the most intensively managed Zone outside of the home and can provide most of our needs.

Zone 2- The food forest and other elements requiring a weekly visit are located here. This area is intensively cultivated and may include circular paths, small ranging animals, tool sheds, wood storage, small ponds, hedges, and firebreaks. Plants are grafted or of selected varieties and are pruned and densely planted with multiple layers. Techniques include spot-mulching, living mulches, terracing, irrigation, long-term composting, and trellis. Ranges for larger animals may also be integrated into this Zone.

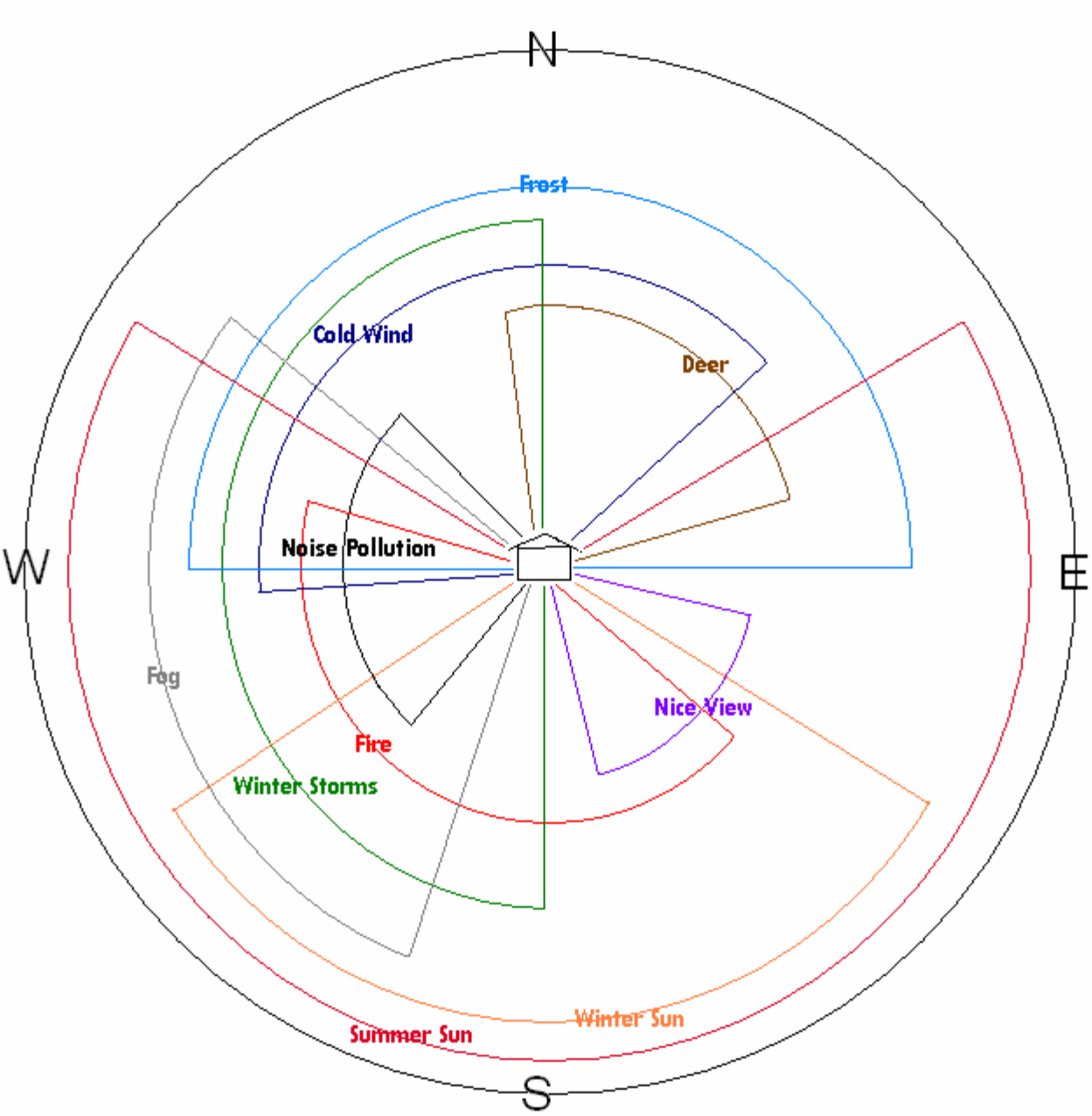
Zone 3- This area can be left alone for weeks and includes field crops (such as legumes, grains, and potatoes), large grazing animals, pastures, barns, large ponds, windbreaks, fuel and fiber coppice, alley cropping, and unpruned hardy trees and nut orchards. Water is stored in the soil through swales and keyline systems. Production for trade happens primarily here.

Zone 4- This Zone can be visited once a year and is used primarily for structural timber woodlots, wildcrafting, berry and fungi foraging, and grazing. This area is semi-wild and is designed to take care of itself, utilizing succession and mostly native plants.

Zone 5- Wilderness. This is where we are a guest, but do not remain. Here we observe the patterns we use in designs elsewhere and experience the larger context that we are just a part of.

Sectors

Sectors are based on the energy flows intrinsic to a site, such as solar exposure, wind, running water, fire, frost, fog, slope and aspect, wildlife corridors, pollution (noise, dust, chemical), and views. These energies can be beneficial, harmful, or benign and elements are placed in a Sector in order to take advantage of the flows, or to block them. For example, a pond may be placed in the fire Sector to block the advance of fire, while sun-loving plants could be placed in the Winter sun Sector for year-round light. The goals are much the same as for Zone Analysis, with emphasis on working with wild Nature and not against it. As with Zones, the location of the house is the typical focal point for Sector Analysis.



West Coast Permaculture Resources

Permaculture Courses

Bullock Brothers'
PO Box 107
Dear Harbor, WA 98243
360-376-6601or 360-376-2773
bullock_orcas@hotmail.com
http://www.permacultureportal.com

Agro-Ecology Northwest
1161 Lincoln St
Eugene, Oregon 97401
541-342-1160
hobbj@efn.org
http://www.cascadiapermaculture.com

Sacred Earth Institute
541-488-0248 or 541-520-0422
andy@sacredearthinstitute.org
http://www.www.sacredearthinstitute.org

Real Goods Solar Living Institute
13771 S Highway 101
Hopland, CA 95449
707-744-2017
sli@solarliving.org
http://www.solarliving.org

Occidental Arts and Ecology Center
15290 Coleman Valley Rd
Occidental, CA 95465
707-874-1557
oaec@oaec.org
http://www.oaec.org

Permaculture Institute of Northern California
PO Box 341
Point Reyes Station, CA 94956
415-663-9090
pinc@nbn.com
http://www.permacultureinstitute.com

Earthflow Design Works
793A Foothill Blvd #130
San Luis Obispo, CA 93405
805-459-0452
info@earthflow.com
http://www.earthflow.com

Guilds

Vancouver Permaculture Network
604-926-3605
haroldw@alternatives.com
http://www.alternatives.com

Bellingham Permaculture Club/
Friends of the Trees
PO Box 4469
Bellingham, WA 98227
360-738-4972 or 360-676-7704
tern@geocities.com
http://www.geocities.com/RainForest/4663/perma.html

Olympia Permaculture Guild
http://lists.riseup.net/www/info/olympiapermaculturegguild

Portland Permaculture Guild
permiegirl@aol.com
http://www.portlandpermaculturegguild.org

Eugene Permaculture Guild
PO Box 99
Eugene, OR 97440
541-684-0066
buddy@copper.net
http://www.heliosnetwork.org/epg/index.htm

Humboldt Permaculture Guild
PO Box 1005
Arcata CA, 95518
707-825-9288 or 707-826-7774

Chico Permaculture Group
530-893-9078

Mendocino Permaculture
c/o Mark Albert
950 Lake Mendocino Dr
Ukiah, CA 95482
462-7843

Sonoma Permaculture Guild
707-874-2342
benja77@earthlink.net

Marin Permaculture Guild
415-662-2398
raisoncain@earthlink.net

San Francisco Permaculture Guild
nitrogenfixer@yahoo.com

Urban Permaculture Guild (Oakland)
c/o Katherine Steele
6421 Hillegass Avenue
Oakland, CA 94618
510-547-7889
info@urbanpermaculturegguild.org
http://www.urbanpermaculturegguild.org

Santa Cruz Permaculture Guild
831-724-5519
permaguildsc@yahoogroups.com
http://groups.yahoo.com/group/PermaguildSC

Magazines

HopeDance Magazine
PO Box 15609
San Luis Obispo, CA 93406
888-206-7070
hopedance@aol.com
http://www.hopedance.org

Websites

http://www.openpermaculture.org

Plant Information and Materials Sources

Books

Brenzel, Kathleen Norris, ed. *Sunset Western Garden Book*. Sunset, 2001.
An essential reference for plant lovers, though the information on food plants is limited. Lists the climate zones appropriate for each species included.

Creasy, Rosalind. *The Complete Book of Edible Landscaping*. Sierra Club Books, 1982.
An early guide to edible landscaping, with detailed profiles on selected perennial food plants.

Facciola, Stephen. *Cornucopia: A Source Book of Edible Plants*. Kampong Publications, 1990.
An overwhelming list of most of the world's edible plants, with nursery sources for the major species. Only for the fanatic.

Fern, Ken. *Plants for a Future: Edible and Useful Plants for a Healthier World*. Permanent Publications, 2000.
Excellent food plant reference for cool, coastal climates. Oriented towards permaculturists and food foresters.

Hart, Robert. *Forest Gardening: Cultivating an Edible Landscape*. Chelsea Green, 1996.
The philosophical treatise of the founder of the temperate food forestry movement.

Hemenway, Toby. *Gaia's Garden: A Guide to Home-scale Permaculture*. Chelsea Green, 2001.
A good summary of basic permaculture garden design, food forestry, and guilds.

Kourik, Robert. *Designing and Maintaining Your Edible Landscape Naturally*. Metamorphic Press, 1986.
The scripture of edible landscaping, with all sorts of lists and handy advice.

Mollison, Bill, and David Holmgren. *Permaculture One: A Perennial Agriculture for Human Settlements*. Tagari, 1981.
The first book on permaculture as applied to farming and urban homesteads.

Mollison, Bill. *Permaculture: A Designer's Manual* (Tagari, 1996).
The most complete and detailed book on permaculture design.

Stebbins, Robert L., and Lance Walheim *Western Fruit Berries and Nuts: How to Select, Grow and Enjoy*. HPBooks, 1981.
An interesting regional guide with information on the common food trees and shrubs and a nifty introduction to microclimates.

Tilth. *The Future is Abundant*. Tilth, 1982.
The first attempt at a bioregional permaculture handbook for Cascadia. Contains a useful plant chart.

Whitefield, Patrick. *How to Make a Forest Garden*. Permanent Publications, 1997.
An exhaustive and thorough coverage of food forestry philosophy and techniques.

Nurseries

Burnt Ridge Nursery, Inc. 432 Burnt Ridge Rd Onalaska, WA 98570 Website: http://www.landru.myhome.net/burntridge/
Phone: 360-985-2873 Email: burntridge@myhome.net
My personal favorite mail order nursery. Has the best prices for most plants, though they tend to be small. A good source for nut trees and many fruiting plants.

Edible Landscaping PO Box 77 Afton, Virginia 22920 Website: http://www.eat-it.com Phone: 800-524-4156
Email: el@cstone.net
A great nursery with a few things that are hard to find elsewhere, though I rarely use them because they are far away and many varieties are not suited to the West Coast.

Forestfarm 990 Tetherow Rd Williams, OR 97544 Website: http://www.forestfarm.com Phone: 541-846-7279
Email: forestfarm@rvi.net
Has many unusual food plants, especially for the understory (the only place I know to find *Elaeagnus* X *ebbingei*). Offers only potted plants.

One Green World 28696 S Cramer Rd Molalla, OR 97038 Website: http://www.onegreenworld.com Phone: 877-353-4028
Email: ogw@cybcon.com
Though their prices are high, the quality of the plants is also high and the nursery makes an attempt to do things organically. Offers a few rare food plants.

Oregon Exotics Nursery 1065 Messinger Rd Grants Pass, OR 97527 Website: http://www.exoticfruit.com
Phone: 541-846-9488
Though the quality was often low, this was the place to find the greatest diversity of rare and experimental food plants. Unfortunately they have been taking a break since 2001 and it is unclear if they will go back into business.

Raintree Nursery 391 Butts Rd Morton, WA 98356 Website: http://www.raintreenursery.com Phone: 360-496-6400
Email: customerservice@raintree.com
The main mail order nursery for backyard fruit growers. Offers many disease-resistant fruit tree varieties and a lot of unusual food plants. An awesome source of information.

Websites

California Rare Fruit Growers http://www.crfg.org
The place to go for information about subtropicals. Local chapters exchange scion wood and seeds annually.

NutritionData.com http://www.nutritiondata.com
Has basic nutrition analyses for a surprising number of foods, though the data is highly variable.

Plants for a Future http://www.pfaf.org
This database is a miracle and has extensive information (including medicinal uses) on most of the species in this book. In addition, there are lists for different uses and multiple ways to access information.

University of California Fruit and Nut Research and Information Center http://fruitsandnuts.ucdavis.edu/
There is some practical information at this website for home gardeners, but much of it is geared towards commercial farmers and needs to be taken with a grain of salt.

Photo Credits

Most of the photographs in this book were taken by myself. The following is a list of other contributors by page and image.

Section 1

Pages 18- 19, Bullock Brothers' food forest images by Adam Clark and Joanna Bremser

Section 2

Page 35, hickory nut (last image) from Purdue University
Page 49, blackhaw from Forestfarm
Page 54, mountain ash leaf from Forestfarm
Page 56, paw paw fruit by Brian Barth
Page 58, black hawthorn leaf from Forestfarm
Page 60, blue banana bean fruit from Raintree Nursery
Page 64, highbush cranberry fruit from Raintree Nursery
Page 64, honeyberry fruit from Raintree Nursery
Page 65, Nanking cherry fruit from Saskatoon Farm
Page 66, oval-leaved huckleberry from Raintree Nursery
Page 69, seaberry fruit by Dr. Alan J. Silverside (www.UniversityofPaisley.uk)
Page 71, wolfberry flower, fruit by Masato Nomura
Page 71, akebia fruit from Raintree Nursery
Page 72, Arctic beauty kiwi leaf from Raintree Nursery
Page 75, magnolia vine fruit from Raintree Nursery
Page 76, sausage vine fruit from Raintree Nursery
Page 76, Stauntonia flower from Forestfarm
Page 77, alfalfa from Ohio State University
Page 79, black salsify flower by Stephen Barstow
Page 79, campanula flower from Forestfarm
Page 83, Egyptian Topset Onion from Saskatoon Farm
Page 84, garlic chives from Edible Landscaping
Page 85, good King Henry by Stephen Barstow
Page 87, Japanese coltsfoot leaf, flower from Forestfarm
Page 96, Turkish rocket by Stephen Barstow
Page 102, catnip flower from Forestfarm
Page 104, garlic mustard by Stephen Barstow
Page 104, goldenseal by Paul L. Redfearn, Jr. c/o Department of Biology, Southwest Missouri State University Ozarks Regional Herbarium (http://www.biology.smsu.edu/Herbarium)
Page 111, tansy flower from Forestfarm
Page 113, yarrow flower (right images) from Forestfarm
Page 115, bunchberry flower from Forestfarm
Page 115, emerald carpet fruit from Forestfarm
Page 117, strawberry flower (second image) from Forestfarm
Page 118, wintergreen fruit from Forestfarm

Plant Index to Food Forest Plant Profiles

This index gives the page number where each food plant can be found in the **Food Forest Plant Profiles**. Plants are listed by both common name(s) and scientific name(s). Pages in **bold** indicate the main entry.

How to Contact the Author

This book is a work in progress with much more information that could be added, and I'm sure there are innumerable mistakes and overgeneralizations. Please contact me if you have any additions or corrections to make and I'll put them into the next edition.

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