

“How to Live Happily with Fruit Trees and Bushes”

Mike Fillon, UGA Extension Master Gardener



Planting a fruit tree is about the future...

- As a general rule, pruning should be done in late fall, winter, or early spring.

It is a true act of optimism and faith...

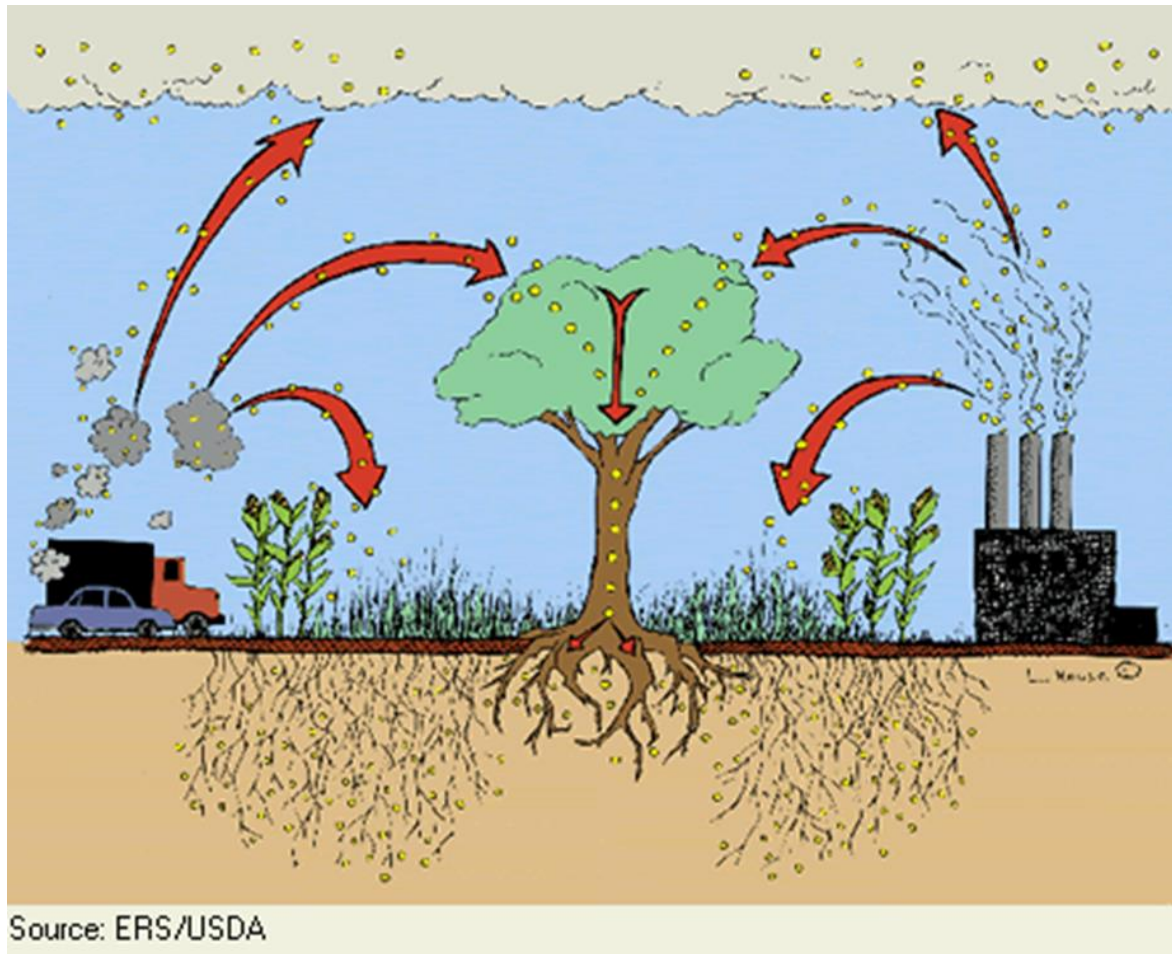
OK- I bought some fruit trees a couple of years ago...

... now what?

First...

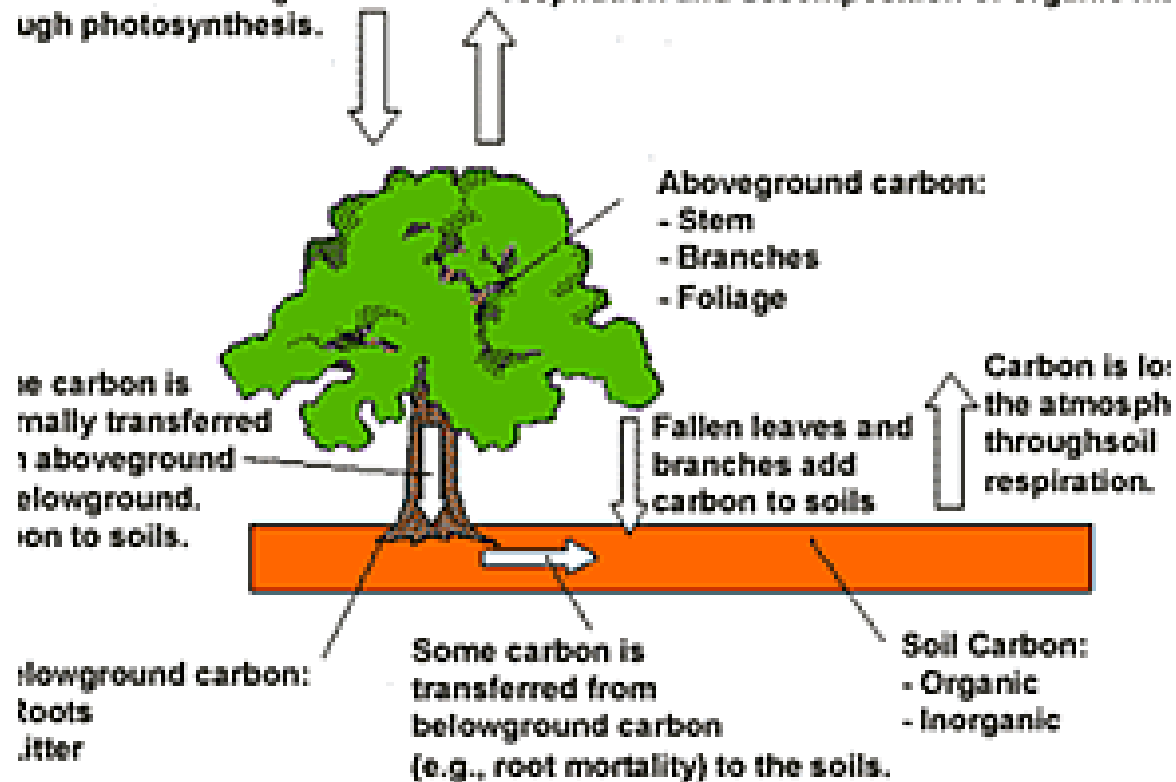
... congratulations...

Trees efficiently remove carbon from the air.



Atmospheric carbon is fixed
by trees and other vegetation
through photosynthesis.

Carbon is lost back to the atmosphere through
respiration and decomposition of organic matter.



For choosing to plant (fruit) trees ...

Or, we could spend millions (billions?) on this.



- Young trees absorb CO₂ at a rate of 13 pounds per tree each year.
- After 10 years they absorb up to 48 pounds of CO₂ per year.

- Your tree(s) have survived, so what do we do until they fruit?

Keys for Growing Healthy Fruit Trees

- Thirst quenching
- Feed me!
- What should I grow?
- Pruning do's and don'ts
- “Outside” help
- Clever laziness

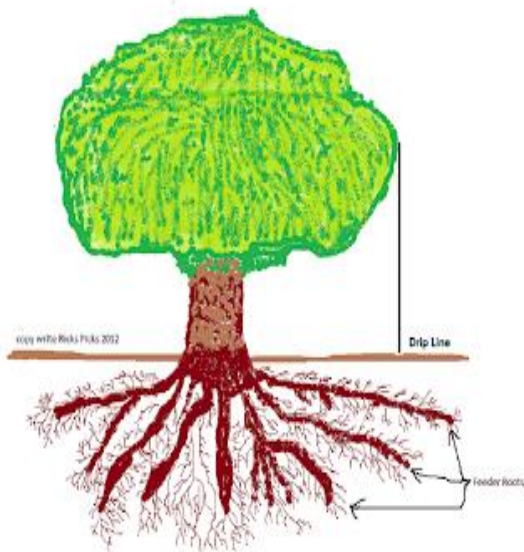
Thirst quenching



- In general, all plants – including fruit trees – need about one inch of water per week.
- Clay is dense, and a slow soak is better than a sudden drench.

- Always try to water very early in the morning or, if necessary, very late at night.
- Try not to water from above.
- Water on the leaves (excluding rain) is an invitation for a fungal disease.





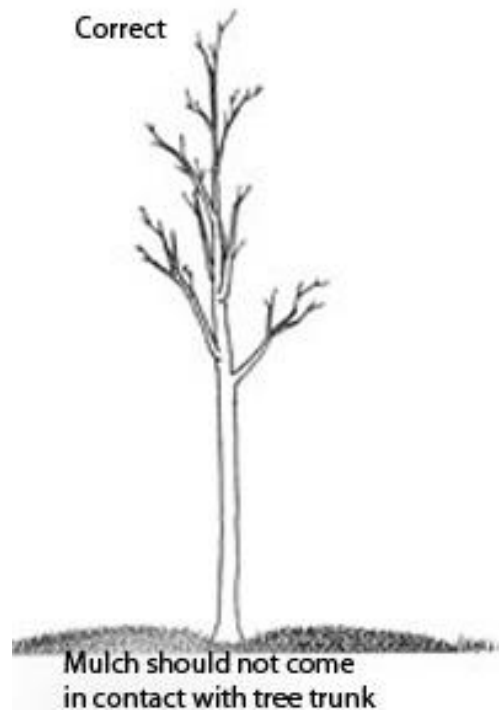
- Water near the ground, at the “drip line.”
- Trees “drink” mostly at root tips.
- With the hose on medium pressure, count “one-second, two-seconds” until you get to “twelve-seconds...” That’s about an inch of water.

- Tap water contains chlorine & fluoride. During a long drought, a constant supply of chlorinated water will eventually do severe damage to your plants.
- Allow buckets of tap water to “aerate.”
- If possible, collect water in rain barrels.



- Watering bags and other devices. (Too close to trunk?)
- Drip lines.

Wood chips and other mulch helps retain moisture





Free wood chips make great mulch. (Allow to age if possible.)

Organic mulch provides nutrient- rich humus as it decomposes while improving soil structure.

Possible Mulch materials

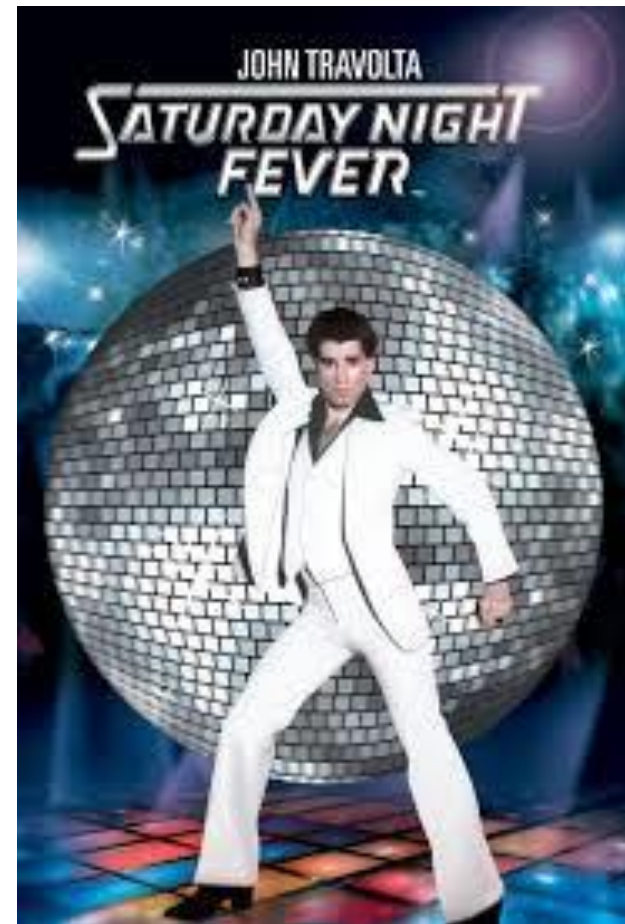
- **Grass Clippings:** Dry or compost before using.
- **Hardwood Bark, Chips, Nuggets & Shredded:** Long-lasting.
- **Mushroom compost:** A good source of nutrients when mixed with soil or other materials. May generate mycelium filaments.
- **Peat Moss:** best mixed with soil and other materials.
- **Shredded Leaves:** Mix into the soil in the fall and allow to break down naturally during the winter for improved soil quality.

FEED ME!



- It's entirely possible to nourish your prized organic fruit trees without using harsh chemicals.
- organic fertilizers are gentler and slowly decompose over time, usually with a superior nutrient profile.

- Fertilizer is generally measured by N-P-K.
Nitrogen (green growth and energy storage),
Phosphorus (roots, flowers and fruit)
- **K** (the chemical symbol for potassium) which affects size, shape, color and flavor.



Fruit trees also need micronutrients and trace minerals

- **1. Iron**
- **2. Manganese**
- **3. Boron**
- **4. Molybdenum**
- **5. Zinc**
- **6. Copper**
- **7. Chlorine**
- **8. Sodium**
- **9. Cobalt**
- **10. Silicon.**

- **Compost does the best job of delivering all of these (Consider free DeKalb mulch.)**
- **Mix fallen leaves and other yard waste (brown) with kitchen waste (green).**

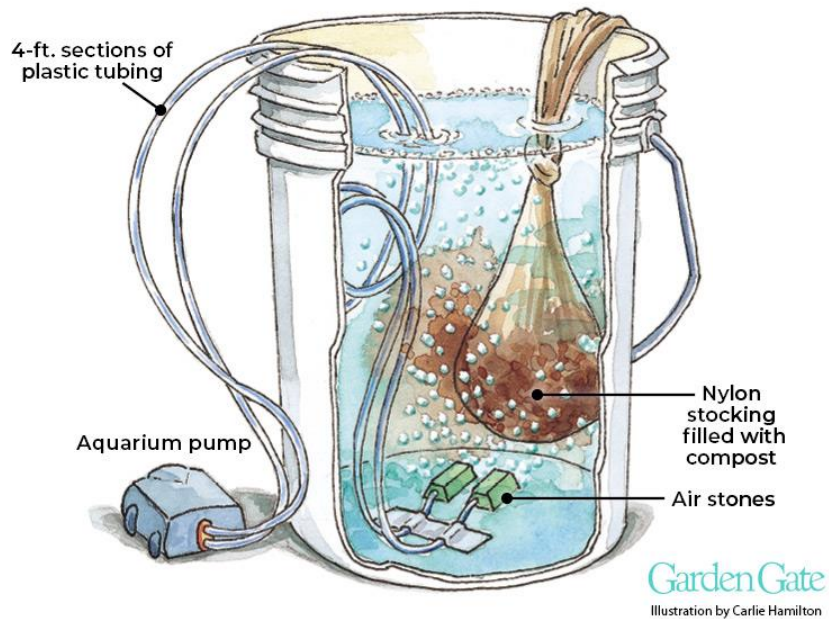
best organic fertilizer types

- **Blood Meal: N-P-K = 13.25-1-0.6**
One of the highest organic sources of nitrogen available, and has the added benefit of repelling deer, rabbits and skunks.
- **Soybean meal: N-P-K = 7-2-0**
This high-nitrogen fertilizer that also contains small amounts of phosphorus and calcium.
- **Cottonseed meal: N-P-K = 6-0-4**
Good source of nitrogen, plus it aids in the formation of beneficial bacteria and slightly acidifies the soil.
- **Feather meal: N-P-K = 13-0-0**
The second-best organic nitrogen source, but because the nitrogen comes from the protein keratin, it is a slower-release form of nitrogen.
- **Alfalfa meal: N-P-K = 3-2-3**
Another slow-release nitrogen source.
- **Bone Meal: N-P-K = 3-15-0** (may vary depending upon production method)
Adds essential phosphorus to soil for root, stem, bloom and fruit production.
- **Greensand: N-P-K = 0-0-3**
A naturally-occurring mineral that adds potassium and also acts as a soil conditioner.

- Avoid manure - unless you know it's source.
- The same with straw. (Sometimes its sprayed with pesticides and herbicides resulting in stilted growth or no growth at all.)

What I use...

BREWING COMPOST TEA



And on occasion...

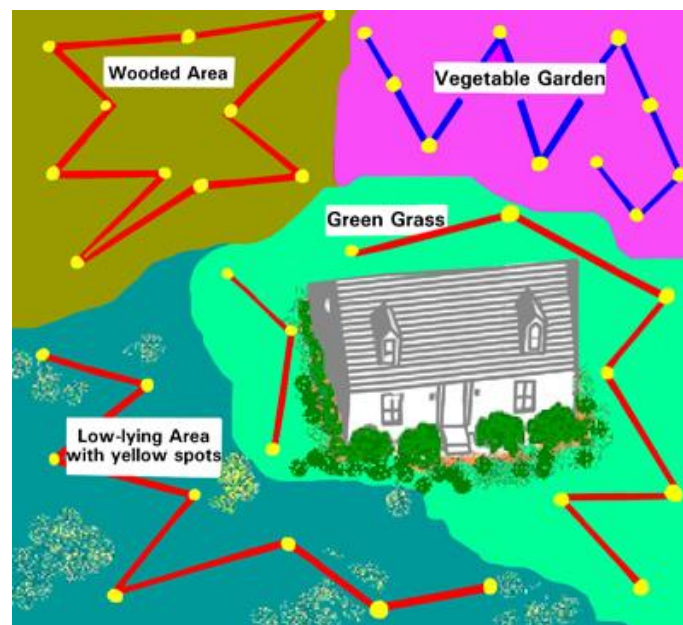


The best time to fertilize is...

- Not in the fall, or even late in the summer. You don't want to stimulate new growth that could be damaged by the hard freezes to come.
- Fruit trees like to be fed between late-February/early March (just before bud-break) and July 1.

Not sure what your trees need?

- Get a UGA Extension soil test
- 10 Extension Office
- \$15 Direct Mail to UGA



- UGA will also test your soil for **harmful metals** (tests S13, S17, S42),
- pesticides (tests S44–S47), **organic solvents** (test S49), and **petroleum compounds** (tests S51 and S52).
- The one on left is \$150.

- **Priority Pollutants** By ICP-AVOES

- Antimony (Sb)
- Arsenic (As)
- Beryllium (Be)
- Cadmium (Cd)
- Chromium (Cr)
- Copper (Cu)
- Lead (Pb)
- Nickel (Ni)
- Selenium (Se)
- Silver (Ag)
- Thallium (Tl)
- Zinc (Zn)

What should I grow?

Fruit to Avoid

- Black walnut
- Bradford pears (Usually don't fruit but can!)
- Cherries
- Goji berries
- Peaches

My “First-Tier” Choices

Criteria: Easy to grow, easy care, few enemies, mostly non-invasive

- **Pawpaw:** Member of the custard-apple plant family; Only native, Semi-Tropical fruit tree.
- **Blueberries:** Early, mid and late season, Rabbit-eye varieties.
- **Goumi berries** (photo)
- **Asian Persimmons**
- **Muscadine & scuppernong (grapes)**





- **Hazelnut** (photo)
- **Figs:** Most popular varieties: Brown Turkey, Celeste, Black Mission, LSU Purple
- **Thornless Blackberries:** Apache (Will spread and may require trellis)
- **Native plums:** American Plum, Chickasaw, roadside and Shawnee
- **Serviceberry (Juneberry)**

Second Tier

(More challenging)

- Apples
- Aronia (Chokeberry)
- Currants
- Elderberry
- Kiwi (require trellis)
- Loquat (photo)
- Mayhaw
- Medlar





- **Mulberry**
- **Pears; Domestic and Asian**
(Need at least 2 for
pollination)
- **Persimmons (Native)**
- **Pomegranate**
- **Raspberries and thorn
blackberries**
- **Seabuckthorn (Seaberries)**

Pruning Do's and Don'ts

“Sunlight is the best disinfectant”
(Louis Brandeis)



- ... pruning also helps air circulation which helps dry leaves and stems and minimize fungus risks.

ALSO:

- If left unpruned, fruit trees may struggle growing.
- Unpruned trees take longer to bear fruit!

Why we should prune New fruit trees

- A bare-root tree has lost many of its tiny feeder roots, which are needed to absorb moisture and nutrients.
- The full-sized top stresses the plant; cut it back.
- The natural shape of a fruit tree is not always the best for maximum fruit production.(REMEMBER: Technically, they're not growing food for us!)
- Start the shaping process as early as possible.

When should we prune?

- *“The best time to prune is when the knife is sharp.”* (Old-time gardener proverb.)
- Technically, you can prune at anytime (with caveats!)

- As a general rule, pruning should be done in late fall, winter, or early spring.



Here's the good news

- Cutting the tree back stimulates stronger, more vigorous, growth from the remaining buds.
- After one year, a pruned tree will be bigger than a matching unpruned tree.
- You should be able to safely remove about **one third** of the tree early in its life.

- Pruning affects over 2,000 plant processes.
- All aspects of tree growth and development are regulated by plant hormones (phytohormones.) They tell trees how to respond when pruned.

Key Goals

- You want to keep your tree from becoming too thick and crowded.
- Remove weak, diseased, injured or narrow-angle branches, and one branch of forked limbs.
- Remove upright branches and any that grow toward the center of tree.
- Keep its height reasonable.
- All these objectives promote improved bearing, which is your overall aim.

- While you should aim for the general shape of the trees in the drawings that follow ...
... allow your tree to express its own individuality.

TIPS FROM THE PROS

10 O'CLOCK PRUNING ANGLE Narrow, V-shape crotches are an open invitations to disastrous splitting later on, particularly when your tree is ripening a bumper crop. So choose wide 10 o'clock and 2 o'clock angles.



PRUNING TO A BUD Make sharp, clean cuts close enough so that you won't leave a clumsy stub that's hard to heal over. Stay far enough above the bud so it won't die back. Slant the cuts as shown, and the new growth will develop beautifully.



Just Right

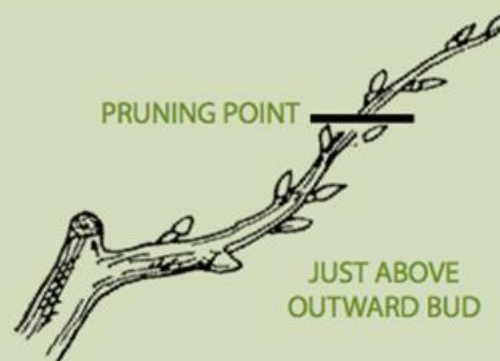


Too Far

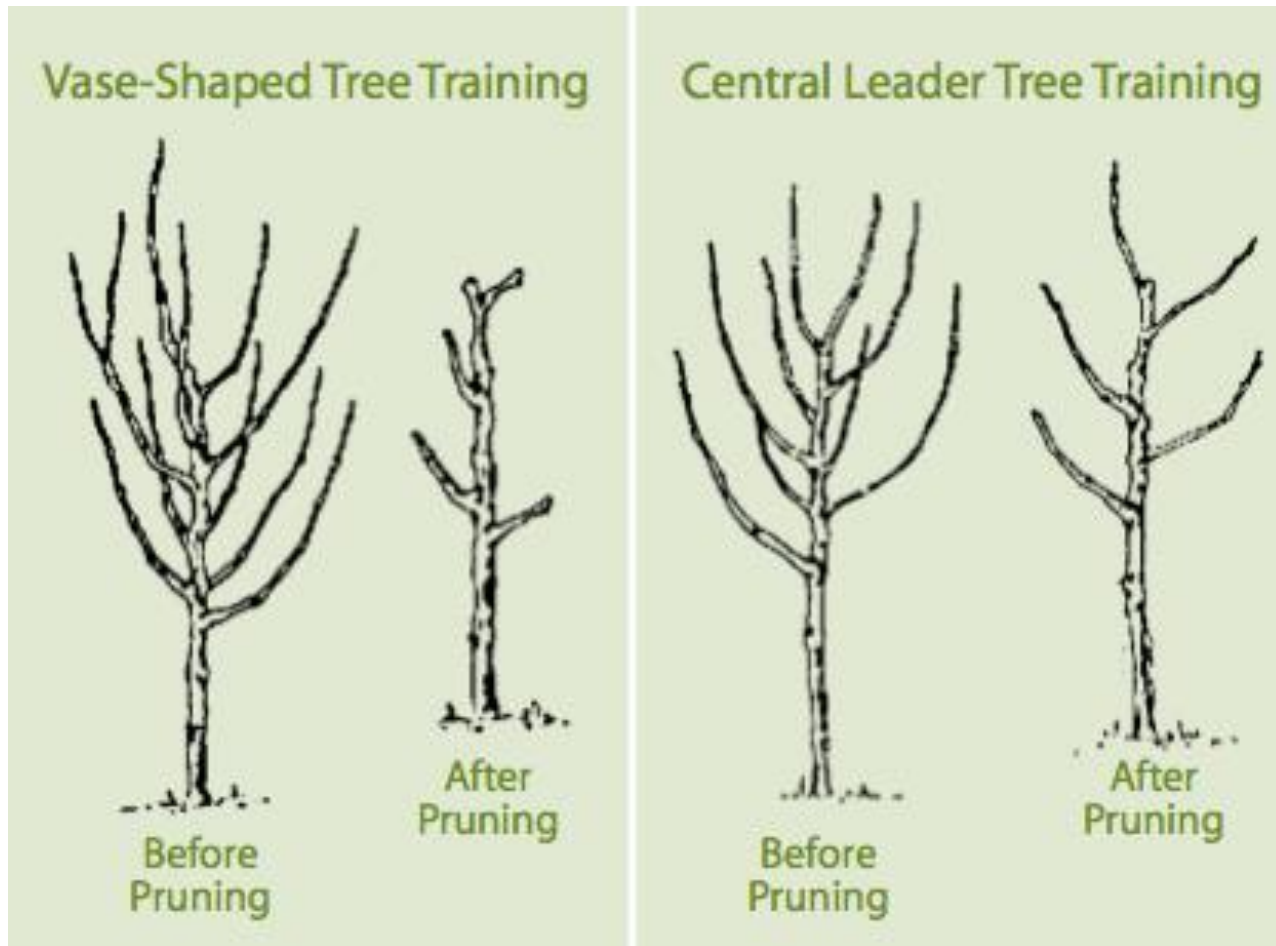


Too Close

ALWAYS PRUNE BACK TO BUDS AIMED IN THE DIRECTION YOU WANT LIMBS TO GROW Every branch has buds pointed in various directions. Since you want vigorous new growth to spread away from the center of the tree, make your cut above a bud that's aimed outward. This helps your tree grow into a spreading shape.



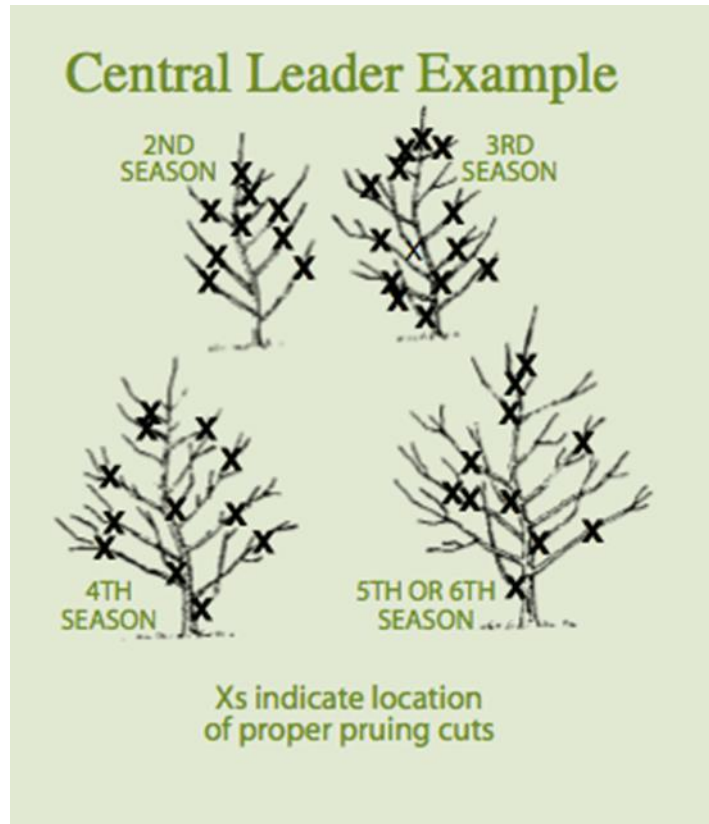
Each, according to its needs...



Peach, nectarine, Japanese plum & apricot.



Apples and pears



Recruit and teach...



Outside Help

- Compost and hard wood chips- build trees natural defense systems
- Foliar spray: Neem Oil
- Foliar spray: Serenade fungicide (*Bacillus subtilis* strain QST 7)
- BT- (*Bacillus Thuringiensis*) Soil & root drench (Dunwoody)
- Beneficial nematodes: Home orchard

- Milky spores
- Spinosad
- Insecticidal soaps
- Garlic Barrier
- Pyrethrum (*Chrysanthemum cinerariifolium*)
- Sulfur Fungicide
- Copper Fungicide
- Surround (Kaolin spray)

Regardless of the substance

I avoid spraying ANYTHING from bud break to petal drop.

Cultivating Food Nature's Way

What the heck does the trendy buzz word
“permaculture” mean?

I prefer a different expression...



Nature's Way

(Source: Landscape Architects Network)

Or, Clever Laziness

There's one indisputable rule everyone plants
something for food or enjoyment must
recognize ...

Nature ALWAYS prevails...

Healthy squash



Squash beetle...



.... hubris never wins.

- Always remember:
- When we plant a fruit tree, we are planting it where we want it....
- ... not necessarily in the ideal location the tree might need in order to survive and thrive. (So we're starting with one strike against us.)

Organically grown peach



Brown rot fungus



Nature's Way:

Fruits, vegetables and herbs are grown without the use of -

- synthetic pesticides, herbicides, or fertilizers.
- sewage sludge or
- genetically modified organisms, or ionizing radiation.

Nature's Way is a system of agricultural principles that simulate natural ecosystems.

So relax....

.... Why fight
Nature?



- It simulates nature by obeying its rules.

- Like all living things, plants have basic needs:

- Nutrition
- Water
- Appropriate sunlight
- Air circulation
- Means to reproduce



All plants have a will to survive....



They don't
want to be
coddled



Most fruit orchards are not normal...

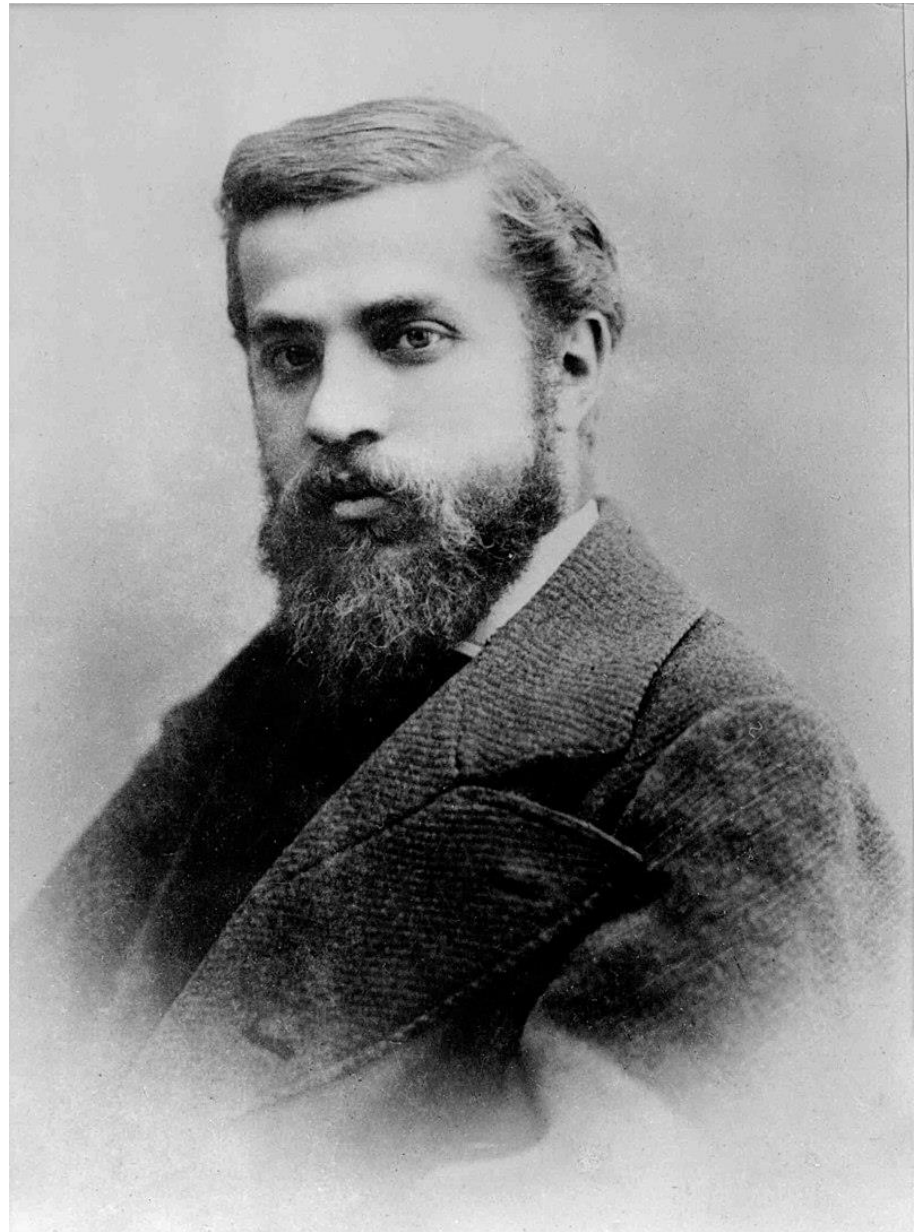


Predators FEAST on monocultures

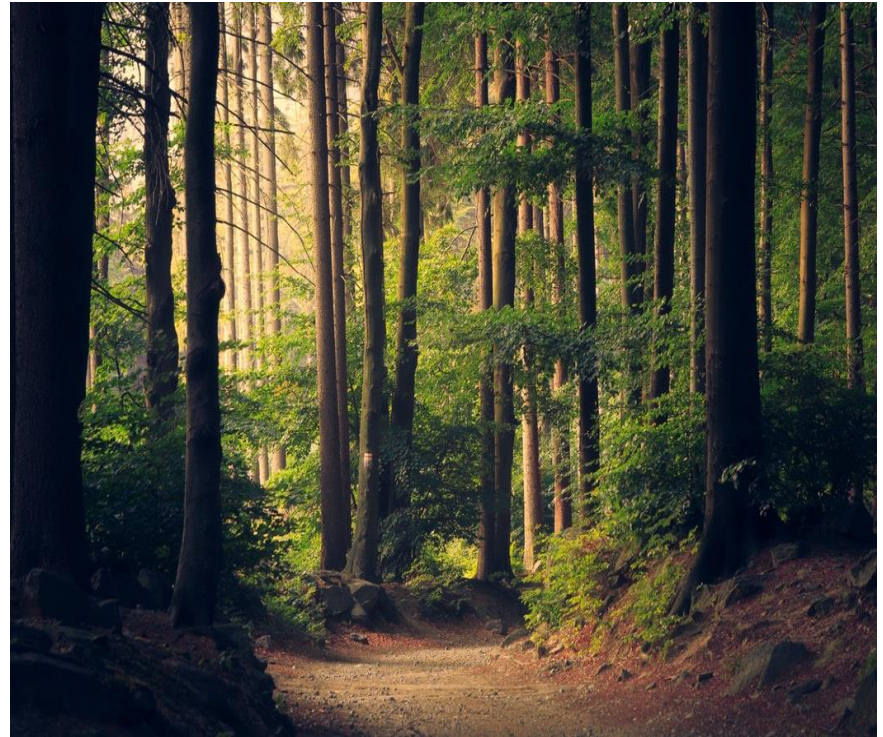


“There are no
straight lines or
sharp corners in
nature...”

Antoni Gaudi (1852-
1926) Architect,
Catalonia, Spain



- Nature doesn't plant trees in straight lines, or concentric circles.
- (Only we do!)



No one sprays
or fertilizes the
forest...



Instead; let's bring the lessons of
the forest into our yards...

Otherwise....

... STRIKE 2!

- The Tucker Orchard Guild (TOG)
- Has planted nearly 500 fruit trees, bushes & companions in the Tucker area over the past 5 years at -
 - Schools
 - In our parks
 - At businesses



Sometimes we have surprise guests.

A life altering experience...



- A few things you might not know...



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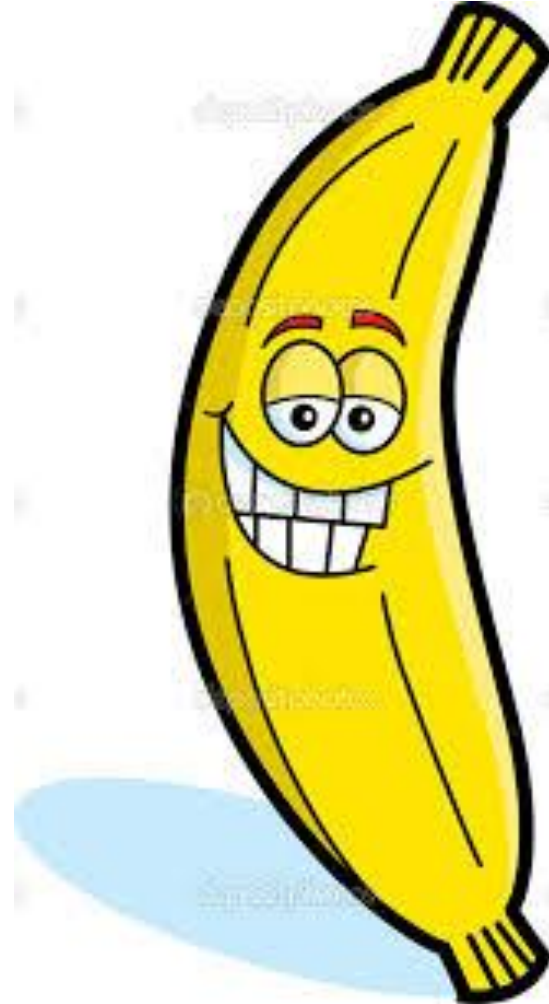
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There are more living organisms in a teaspoon of soil than all the humans on Earth.



Oak tree DNA shares the same building blocks as humans, has similar gene structure and may encode for some proteins that are similar to humans.

We have a
60% genetic
similarity
with banana
plants.



- Fruit flies?

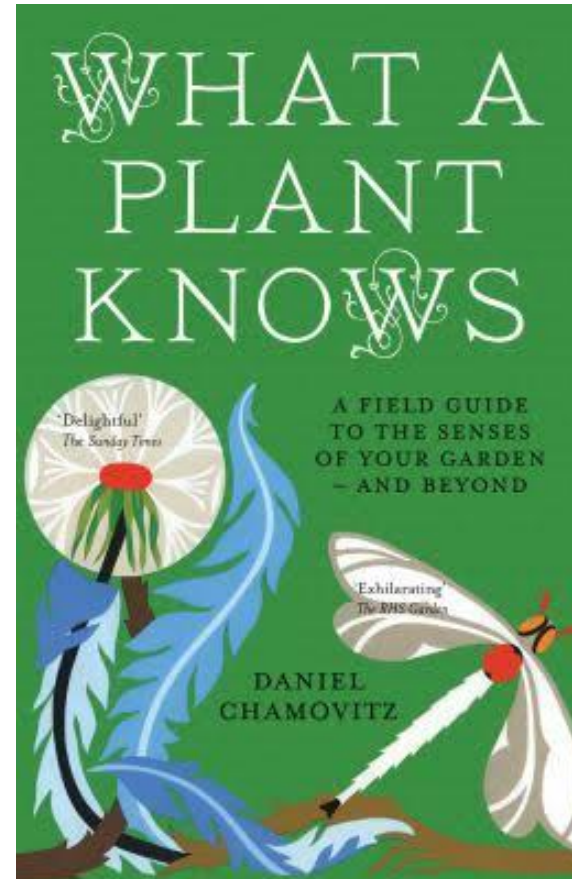


60 percent identical

By Daniel Chamovitz, Ph.D.,

Director of the Manna Center for
Plant Biosciences at Tel Aviv
University.

The science behind how a plant
senses and adapts to its
environment. (2012.)



Unlike animals who can move around in search of food, shelter or a mate, plants are confined to one spot.

In fact, their lack of movement **heightens** their defense systems.

- *"Because of this ..." writes Chamovitz, "... plants have evolved complex sensory and regulatory systems that allow them to modulate their growth in response to ever-changing conditions."*

When leaf-eating insects attack a plant, the affected plant emits volatile chemicals into the air. **Through "smell,"** this effectively warns neighboring trees of a possible attack.
(More about this later)



A special note about global warming & climate change

Elevated CO₂ impairs a key component of the plant's defenses against leaf-eating insects.

In other words, we're compromising the plant's ability to defend itself.



According to the best seller, *The Hidden Life of Trees: How they Feel, How They Communicate*, by German botanist and forester Peter Wohlleben, the forest is a social network.

- Wohllegen describes how trees are like human families:
- Tree “parents” live together with their children,
- Communicate with them,
- Support them as they grow,
- Share nutrients with those who are sick or struggling, and
- Even warn each other of impending dangers.



The Tucker Orchard Guild's Planting Beliefs & Guidelines

(Or, what the chemical companies don't want you to know!)

There are three parts of this:

- **Building the best soil money can't buy**
- **Companion planting, including fruit tree guilds. (Or, what the forests can teach us.)**
- **Putting insects to work.**

For soil building, there are two major thrusts:

- **“Wood- Wide” Web**
- **Soil Food Web**

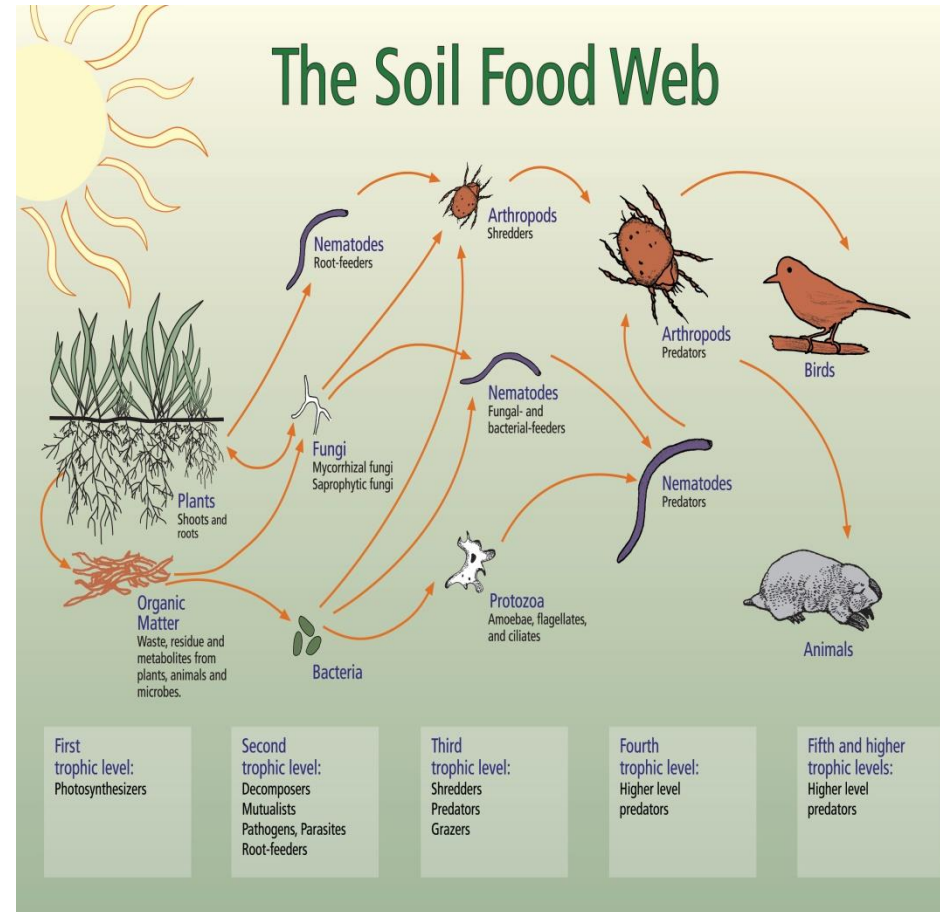
Wood-Wide Web

- 'Wood wide web'—the underground network of microbes that connects trees—the millions of species of fungi and bacteria swap nutrients between soil and the roots of trees, forming a vast, interconnected **web** of organisms throughout the woods.
-
- Mycorrhizal networks are underground hyphal networks created by mycorrhizal fungi that connect individual plants together and transfer water, carbon, nitrogen, and other nutrients and minerals.



The soil food web

- The soil food web is the community of organisms living all or part of their lives in the soil.
- It describes a complex living system in the soil and how it interacts with the environment, plants, and animals; and describes the transfer of energy between species in an ecosystem.



The Soil Food Web

This is the work of “soil pioneer” Dr. Elaine Ingram, from Oregon State University:

“Our soil teams with a multitude of organisms which provide the necessary work for healthy plants to grow free from disease, ...pests, and infertility...”



- **Good nutrition – for us and our trees- begins in healthy, chemical-free soils:**
- The issue of endocrine disruption pesticides and other, should be of great concern to our health.
- As author Michael Pollen says, “We are what we eat, eats!”

We want living soil, NOT dead dirt.

Besides lack of a well-rounded nutritional profile
(as mentioned before) three main problems with synthetic
fertilizers:

:

1. Pollution and leaching

The salts they contain leach from the soil into groundwater, and end up in rivers and lakes.

The extra nitrogen washing out of urban soils into the water cause algae blooms, which suffocate fish and other aquatic animals.



2. Synthetics do not “feed the soil”

... and drive off beneficial insects.

The result is a steady decline in the overall health of gardens.

Weeds and pests become more prevalent. This results in a steady downward cycle of greater fertilizer and herbicide treatments.

NOTE: DO NOT CONFUSE weeds with groundcovers and other nitrogen fixers including clover!





3. Your plants form a chemical dependency –

Since nutrients are too available, your garden plants and lawn have no need to grow strong roots in their search for nutrients. With a stunted root system, they are less resistant to weeds and pests, forcing the constant use of pesticides.

What are Fruit Tree Guilds?

(Applies to vegetables, also)

Fruit tree guilds are complementary plants – with distinct roles- surrounding a single or cluster of fruit trees emulating the symbiotic relationships that exist between plants in nature.

Each plant benefits others in the vicinity, interact with animals and soil microorganisms to create an ecosystem.

Suppressors:

A circle of bulbs underneath the drip line subdue grass growth which competes with the fruit tree and the surrounding plants for nutrients. **Alliums such as chives, leeks and garlic** are good choices. The best plant is the **daffodil**, because they deter deer and rabbits which find them poisonous.





“Attractors”

Dill, fennel and coriander: These attract a beneficial variety of insects to the guild; some help pollinate the plants, while others prevent damaging species of insect from becoming a problem.



Repelers

Besides attracting predators, these plants **repel potentially damaging insects**. **Nasturtiums** are best for this function; and many commercial apple orchards plant them around the base of the trees to help protect their crops.

Mulchers

These plants **naturally provide mulch** to the guild by leaving on the ground to rot into the topsoil, providing nutrients that all the plants in the guild can access. **Comfrey**, **artichokes** and **rhubarb** all work well as mulchers.



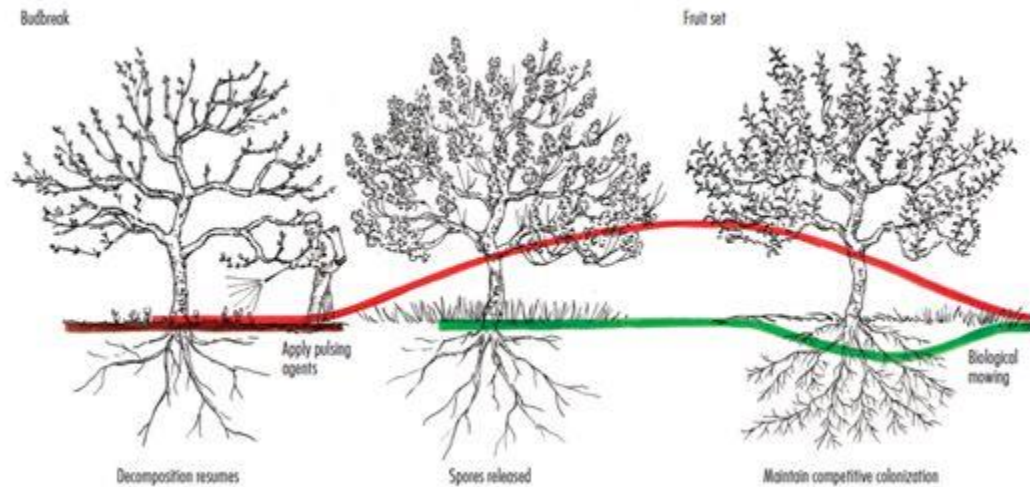
Fixers

Besides the nutrients added by the accumulators, **these plants add the best form of nitrogen in the soil.** Leguminous plants have special nodules on their roots that form a symbiotic relationship with certain soil bacteria to help 'fix' nitrogen. **Clover, hairy vetch, peas, beans and alfalfa** are all regarded as fine nitrogen-fixers.



The Fungal Curve

(SOURCE: *The Holistic Orchard*, by Michael Phillips)

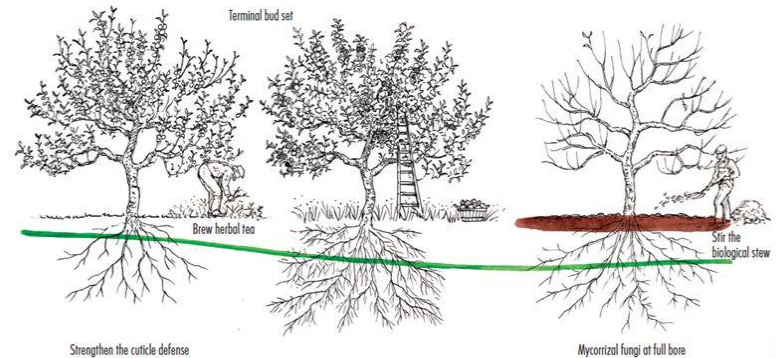
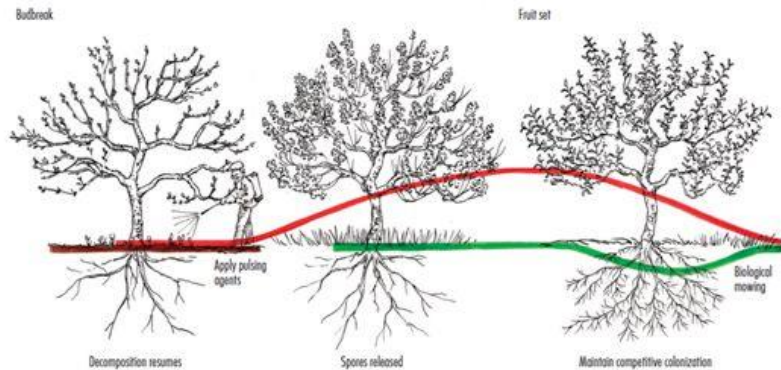


The Fungal Curve

(SOURCE: *The Holistic Orchard*, by Michael Phillips)

Fungal disease spores arise from the ground surface to infect tender fruit tissues. (Red Curve)

Beneficial fungi and bacteria also arise and establish on the foliar surface. (Green)



Fungi and bacteria are both decomposers in the soil, they degrade plant residues differently and have different roles in the recycling of nutrients.



This is why we use cardboard when we plant fruit trees- and why we add wood chips, mulch and compost;

It's because we want a fungal dominant soil..

**We want a soil that's full of the beneficial
fungi that help woody plants grow vibrantly
and resiliently,**

and,

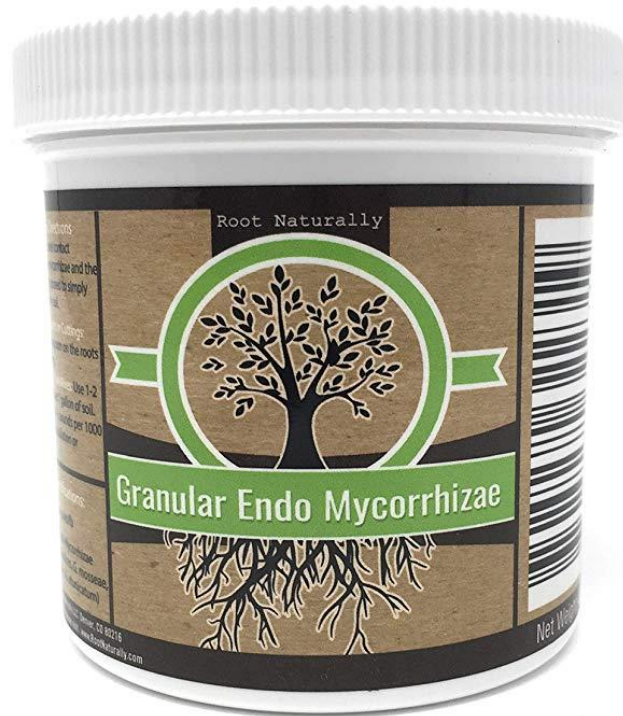
aid, we hope, in inter-tree communication.

There's **beneficial** fungi....

.... And also **pathological** fungi.

We want one but not the other!

- **Tips to prevent bad fungi:**
- Sunlight is the best disinfectant
- Air circulation
- Active mycelium network to overpower root entry.



- Our body's own remedy- the immune system- is far more powerful than any medicine we have devised." Dr. Daniel M. Davis, *The Beautiful Cure, The Revolution in Immunology and What it Means for Your Health*

- To repeat...

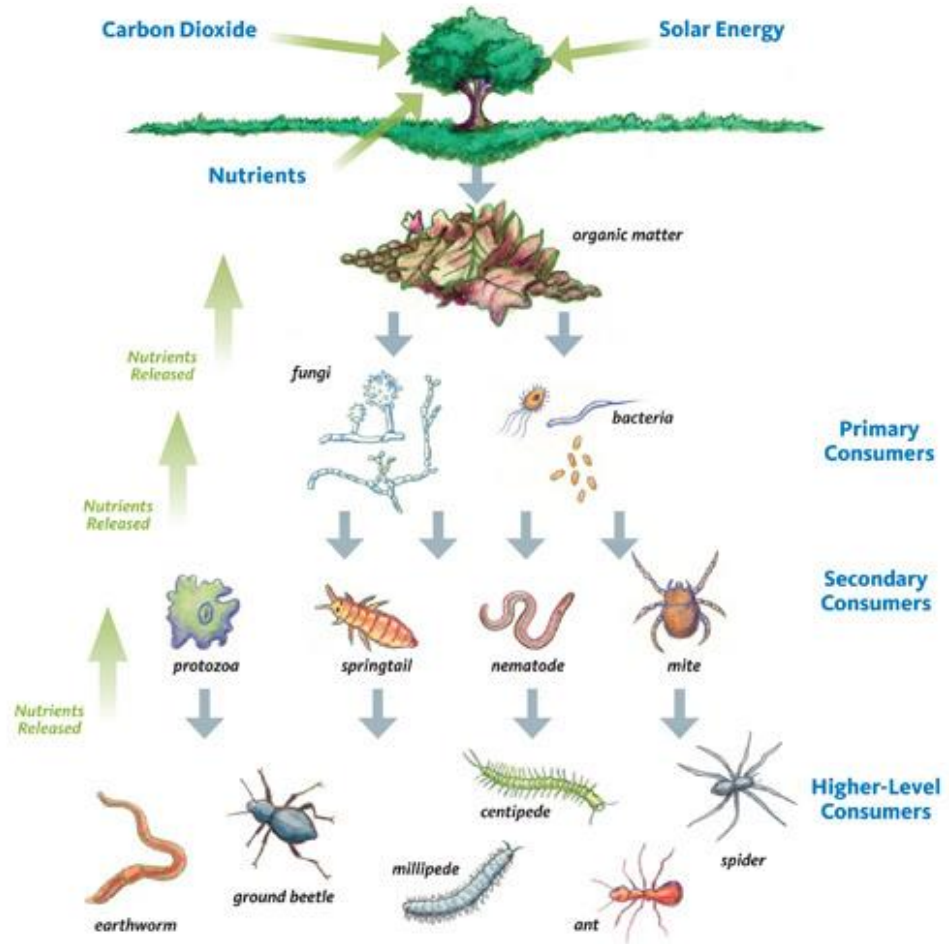
Plants also possess a range of active defense abilities that respond to pathogens

– such as bacteria and fungi-

and also parasites, from microscopic viruses to phytophagous insect.

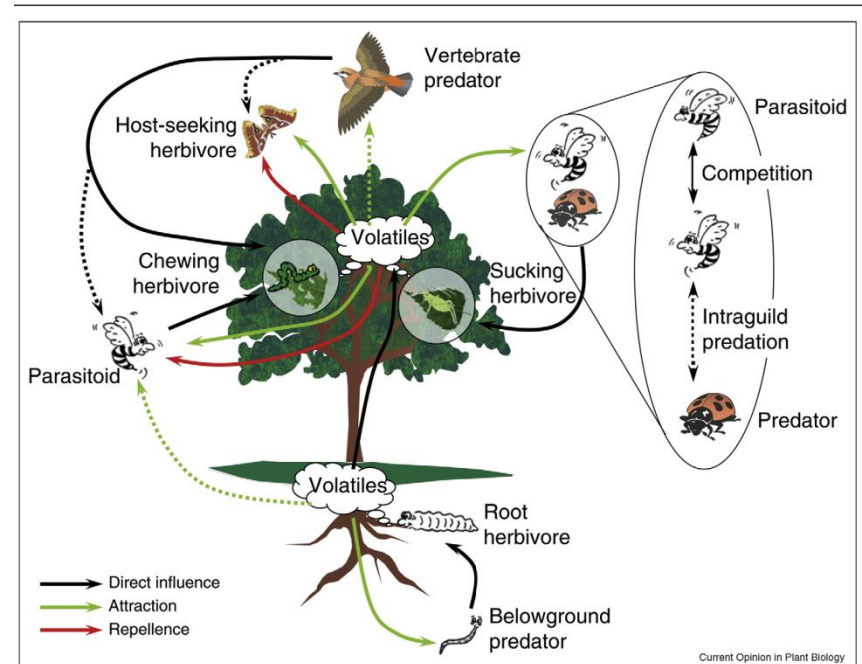
- While plants don't have white blood cells and other immune system traits like animals, they do respond via systemic acquired resistance (SAR) and induced systemic resistance (ISR)- similar to our ability, in a sense, to “learn” and adapt...

“... these interconnected interactions and feeding relationships (quite literally "who eat who") help determine the types of nutrients present in soil, its depth, and pH, and even the types of plants which can grow.”



Putting Insects to Work

- Plants under attack by herbivores (vegetative-eating insects), send out chemical signals known as **herbivore-induced plant volatiles (HIPV.)** These signals are received by carnivorous insects- telling them a plant is under attack and, by the way, as a meat-eater, you'll find the attackers delicious.



It's estimated that at any given time,
there are 1,000 different types of insects
in the typical backyard.

What percent do you think cause the
most damage to our plants?

Only three percent....

This means that **when we spray** to kill insects we also risk killing the beneficial and harmless ones, leaving more room for infestations of the bad bugs, throwing that natural balance out of whack...

- Here are some of the friends you'd like to attract....

Lady Bug



Assassin Bug



Praying Mantis



Big-eyed bug (Geocoris)



Other tips

- DO NOT TILL:
- Only disturb the soil as much as necessary.
- According to the book, *Weedless Gardening* by Lee Reich, there are 140 weed seeds buried in each pound of soil.

Many weeds are NOT weeds:

- Clover is a great nitrogen fixer.
- Dandelions mine minerals deep in clay soil and bring them to the surface

If you stake a plant, keep it loose, and
only for a year.

- To develop girth, trees need to “Sway.”
- Labels that surround a tree MUST be removed before they choke off nutrition.

Battling biting ants?

- Spreading coffee grounds will drive them away.

While many people think organics, permaculture, sustainability and other “granola” ideas are too time consuming, and require back breaking work - even with the acknowledged benefits- if we let nature do their part (by cooperating with her!) ultimately it ends up being a lot less work.

And that’s not a quote from Dr. Ingham-

That one’s from me!



So; what do organics,
permaculture and sustainability
mean???



they mean ensuring a bountiful planet for future generations...

...Nature's Way.