Companionable Planting
Beyond Tomatoes and Marigolds

Joan Pont, Avid Gardener
Sloat Seminar, June 15, 2024

Goals

What works and what is tradition? Why?

When do some combinations help plants, deter diseases and infestations, increase yields, improve soil structure and nutrients, and make your edible garden more beautiful while supporting nature in its entirety

Plant Partners: Science-Based Companion Planting Strategies for the Vegetable Garden by Jessica Walliser

New Concepts - New Names

Old Term - Companion Planting

Helpful suggestions mixed with folklore, urban legend, and sometimes coincidence

New Terms - Polyculture, Interplanting, Intercropping, Regenerative agriculture

Invented Term (by me!) - Companionable Planting

UC Davis: Resilient Cropping Systems for a Sustainable Future, Agroecologist Amelie Gaudin

From the Garden to the Vegetable Plot

Many have transformed their gardens to natural habitats of native plants for native fauna like insects and birds

Native plants are adapted to local conditions like our summer dry climate and support local insects which in turn feed birds

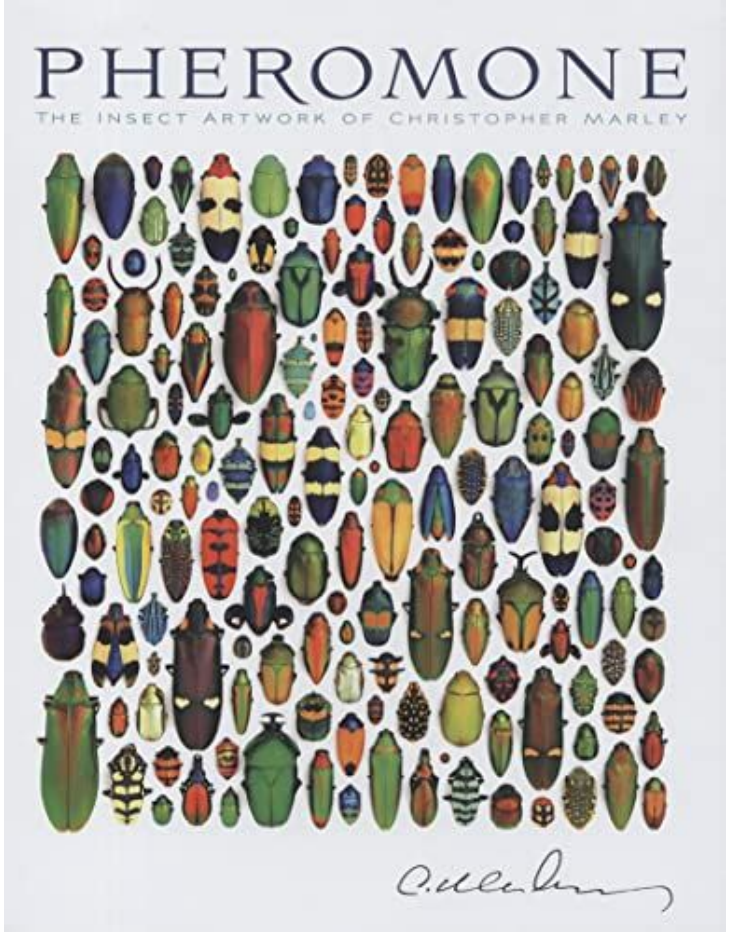
Time for the vegetable patch to catch up!

cnps.org California native gardens are sustainable, save water and provide habitats for pollinators

How to Get There

Learn to love insects

Learn a bit of botany, specifically “plant families”, to truly diversify your garden



Pheromone: The Insect Artwork of Christopher Marley

Wait, What? *Increase* the insects on your garden?

Seems counter intuitive

One generally protects plants from nibblers (insects that eat leaves), suckers (insects that drink phloem, sugary fluid)

Tolerate, don’t eliminate

Imagine a Miniature African Serengeti

Herds of herbivores (plant eaters)

Wildebeests, Zebras, Impalas, Giraffes, Elephants

Very few predators: Lions, Leopards, Cheetahs, Hyenas

One Hungry Lioness

If you eliminate the predator, you inherit their job

Move up the food Web

Leaves are low calorie-density food

You probably diet on celery and splurge on cheese

Caterpillars converter this low calorie food to nice nutritious packets of protein and fat for the birds to feed their young

Western Bluebird with a mouthful for his growing chick

Insecticides kill off the herbivores *and* the insect carnivores

The herbivores reproduce with avengence

The carnivores reproduce more slowly

The rebound makes for an imbalance with too many herbivores, tempting one to respray, worsening the imbalance

Convergent lady beetle eating an aphid. [J.K.Clark]

Fly Away, Ladybird Beetle, UC ANR words of advice

Purchased Ladybird Beetles need refrigeration and light misting to avoid dehydration while in the store

One needs 1,500 beetles, and a repeat 1,500 beetles released a week later for one heavily infested rosebush

Hence, nurture your indigenous population, and wash off the extra aphids with a squirt of water and gentle rub of your thumb

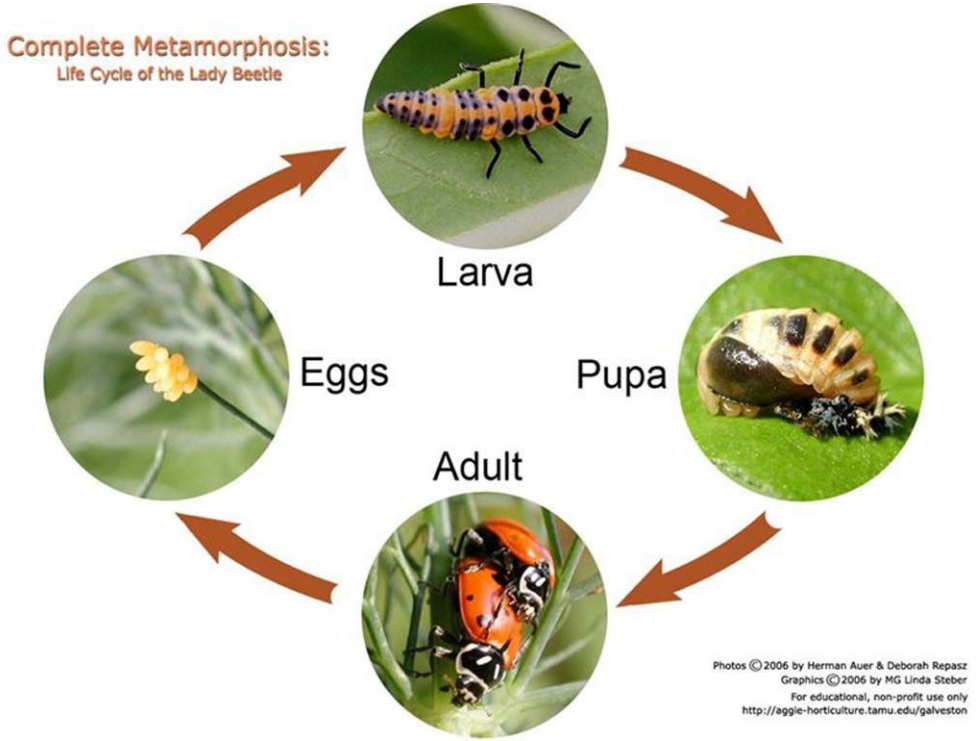
The larvae of beneficial ladybugs doesn’t look anything like the adult form, and they also eat pests (Photo Credit: Amy Prentice). UCANR = University of California Agriculture and Natural Resources

Egg Larva Pupa Adult (or Imago)

Most insects have 4 life stages (some three, since they skip the pupa)

Eggs hatch into larvae which munch and grow. Then they pause in a pupa, changing into an adult

Just like Superman in the phone booth, they emerge as an adult, mate and lay a new set of aggs



Too Perfect?

Admission: too perfect leaves and flowers creep me out

Caterpillars nibble leaves and convert low calorie food to delicious nutritious bird food

Caterpillars that escape predation pupate and turn into butterflies and moths

I’m always suspicious that insecticides were used, and persist up the food chain

Sloat partners with vegetable growers that are insecticide-free

So, no Insecticides, what do I do?

Invite more in!

Reduce Pest Pressure - Add an Insectary Row

Many vineyards plant an insectary row every fifth row of mixed wildflowers

The beauty belies the real reason, beconning insects to eat pest insects

Simple open flowers work best. No fancy cultivars!

UC IPM (Integrated Pest Management) Adult syrphid fly, hoverfly. Credit: Jack Kelly Clark

Original Form Often Best

When is a rose not a rose that can support pollinators?

When was it bred to have too many petals, for *our* aesthetics

Rosa californica, native rose found on hikes, 5 petals, stamens filled with pollen on a pink platter, and rose hips in the fall loved by birds

Cultivated rose, more than 40 petals and no access to insect food

Top: Charming *Rosa californica* from Calscape.org. Bottom: Impressive breeding but impractical

Reduce Pest Pressure - Support Beneficial Insects

Invite your friends: Parasitic wasps, Robber flies, pirate bugs, hoverflies, lacewings, ambush bugs, ladybird beetles, crab spiders, and predatory mites

Feed your friends: variety of flowers, successively blooming nearly year round

Some insects are predaceous in one life stage and not another. Parasitoid wasps eat pests only in the larval stage, and need pollen and nectar when adults

The Benziger insectary was designed by Alan York. In 1995, part of a vineyard was removed to make room for the insectary, which brings balance and creates a stable, healthy environment. Photograph courtesy of Benziger Family Winery.

Reduce Pest Pressure - Insectary Garden vs Pollinator Garden

Curiously, they are different

Pollinator garden supports bees, butterflies, hummingbirds

An insectary is a diverse collection of plants that attract, feed and harbor beneficial, predatory insects such as ladybugs and lacewings that help manage harmful bugs such as aphids.

Red clover, poppies and bunch grasses surround the raised vegetable beds

Reduce Pest Pressure - Annuals vs Perennials

Annuals work In areas that are replanted every year, like vegetable gardens. Mix plants that are early, middle and late bloomers to support beneficial insects. Native wildflower mixes work well: poppies, tidy tips, baby blue eyes, clarkias

Perennials work in permanent areas like orchards or around beds. Include native bunch grasses that are host plants (eaten by caterpillars) and are habitat for predatory beetles. Think yarrow, native buckwheats, epilopiums, salvias, lupines

Not all pure utility, beauty too! *Epilobium canum,* California Fuchsia

Reduce Pest Pressure - Tricks Plants Play

You want insects around

Plants just have to outgrow the nibblers

Plants can beacon predatory insects to the rescue with volatile chemicals

Plants can deter nibblers with toxic chemicals (some of which we enjoy like caffeine)

Praying Mantis are insect eaters, but other predatory insects are omnivores, like us. Provide flowers for nectar and pollen for a well rounded diet.

More Insects: Free Weeding Friends

A plant that is not nibbled by insects came become invasive, weeds that are unchecked

Native plants co-evolved with local insects into a sort of detente. You take just enough to survive and let me survive as well

My most hated weed, Foxtail, *Hordeum murinum*. Wikipedia. No local natural nibbler

Second Strategy - Plant Diversity

Sobering Reminder: Irish Potato Famine

1845-1852

Crop Failure, Starvation and Emigration of a million people from the small island

Potatoes, the main crop, routinely cloned by propagating vegetatively, not from seed

Culprit: *Phytophthora infestans*, related to algae

Disease spreads like wildfire in a monoculture

The Emigrants' Farewell, engraving by Henry Doyle (1827–1893)

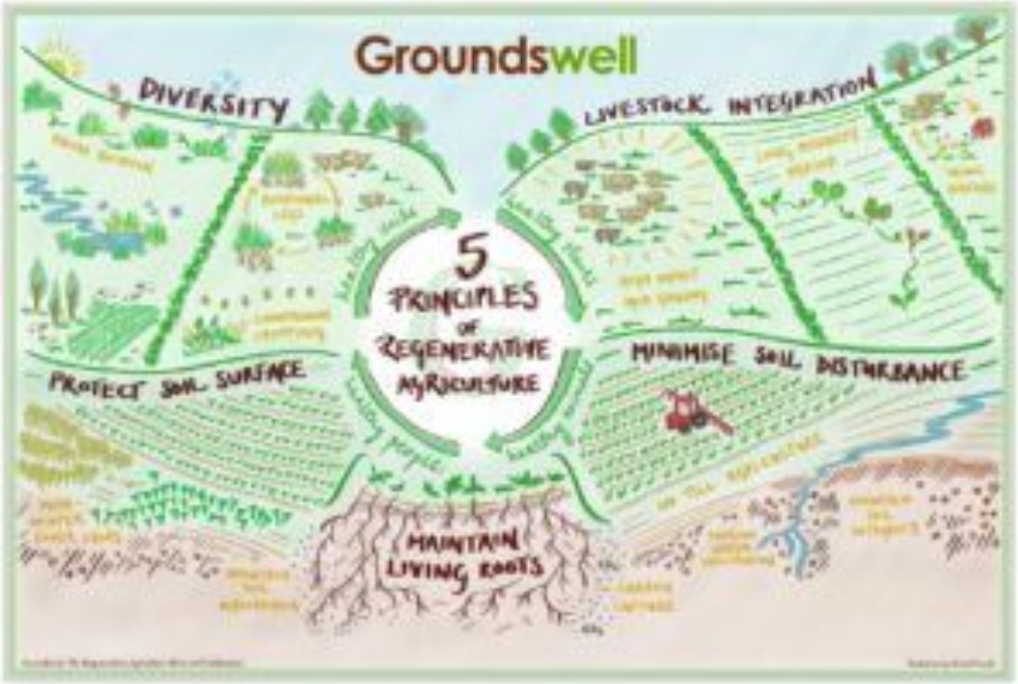
Tenets of Regenerative Agriculture

Diversify by

Different plants side by side

Different insects visiting

Different microorganisms in the soil



https://groundswellag.com/principles-of-regenerative-agriculture/

Plant Families - Warning, this gets geeky

Domain

Kingdom

Phylum

Class

Order

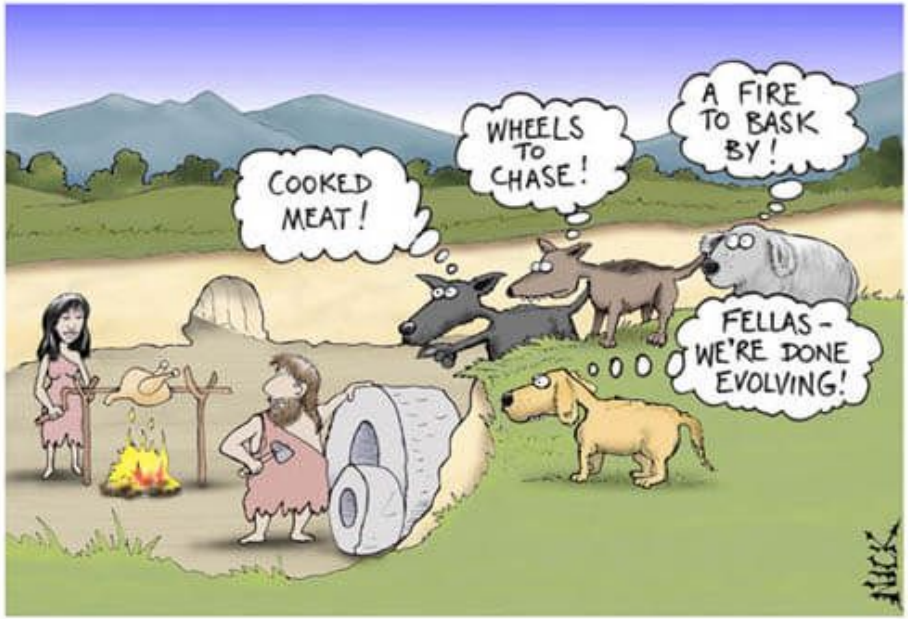
Family

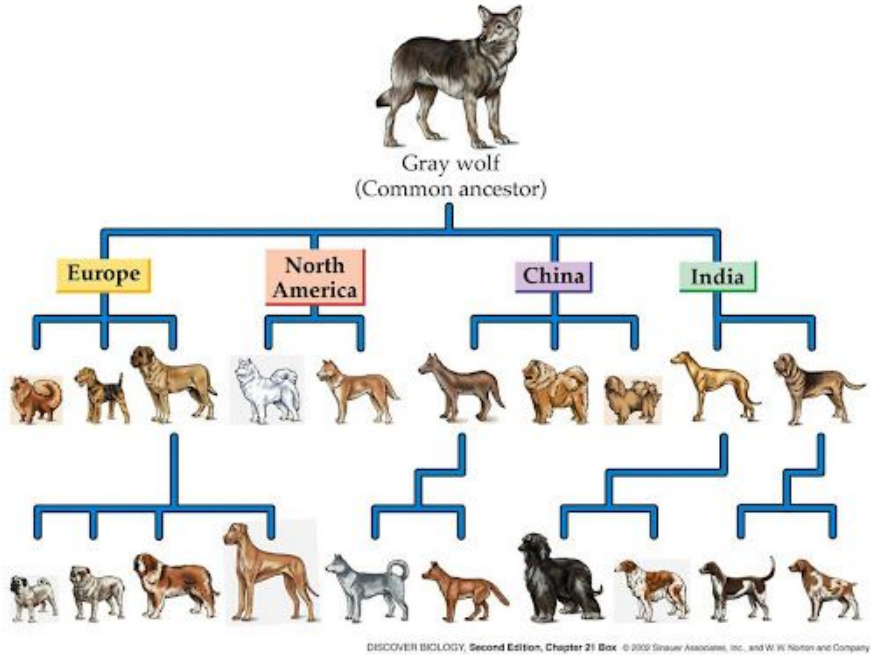
Genus

Species

Carl Linnaeus 1707 - 1778

Dog Evolution - Comic vs Science...

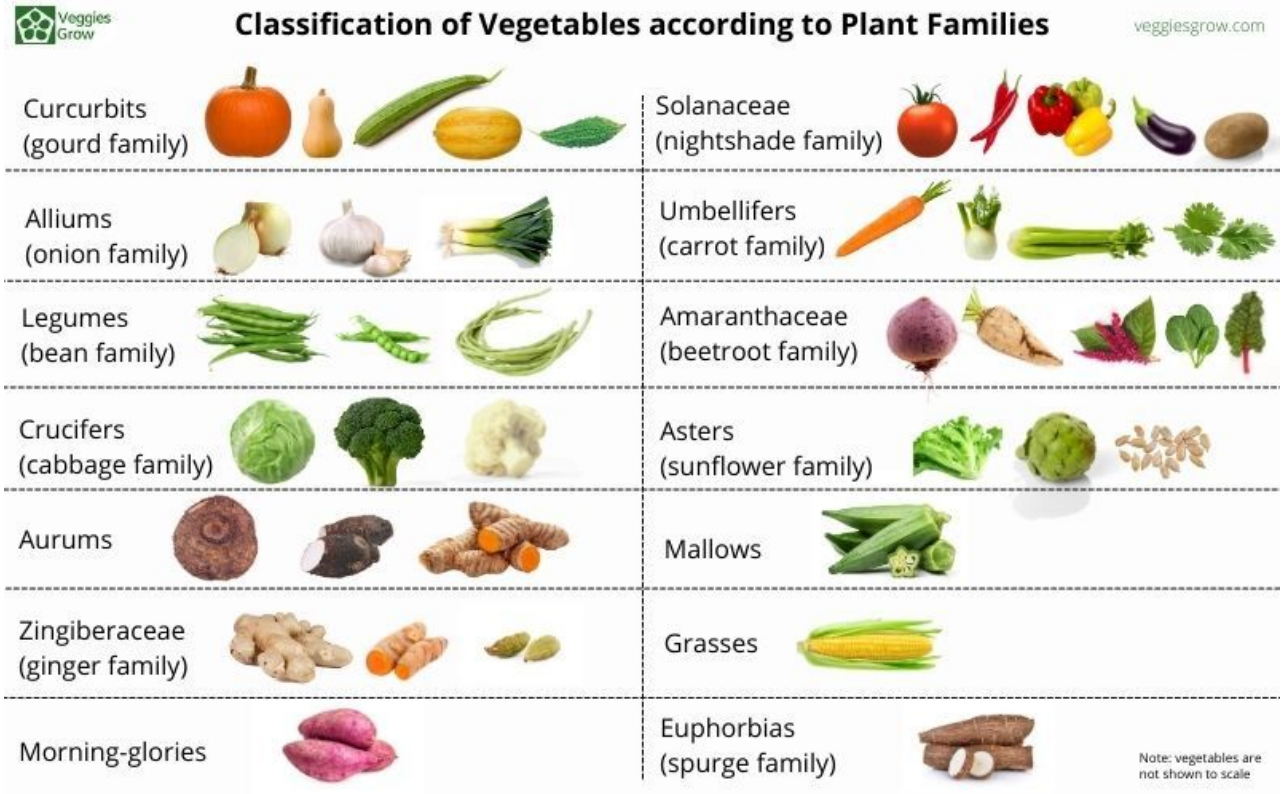




Forget the experts; domestication of the dog only took about 8 seconds.

Brought to you by Dogica.com

Grocery Store Botany



Mint Family (Lamiaceae) 3500 species

Mint

Basil

Rosemary

Sage

Thyme

Oregano

Chia (seeds)

Lepechinia fragrans, Fragrant Pitcher Sage, tubular flowers, opposite fragrant leaves, square stems

Sunflowers and Lettuce? Asteraceae

Flower architecture is the key

Edible and great companion plant

Supports pollinators and Parasitoid wasps

Delta Sunflower, California native with multiple flowerheads

Tomato Family (Solanaceae)

Tomatoes

Eggplant

Bell Peppers

Chile Peppers

Potatoes

Goji Berries

Tomatillos

Peruvian Groundcherry

Eggplant flower, Wikipedia, members of this family generally need buzz pollination

Cabbage Clique (Brassicaceae)

Cabbage

Broccoli/Cauliflower

Bok Choy

Rutabaga

Turnip/Radish

Arugula

Seeds for Canola Oil and Mustard

Nature Clearly: Mustard plant characteristics, note 4 petals, 6 stamens, 4 long and 2 short

Cover Crop and Interplanting

Agricultural terms adapted to the home vegetable garden

Instead of a fallow field or empty bed, a **cover crop** is grown, but not considered a cash crop

Fallow fields degrade soil, they do not “rest it”

Growing plants provide root exudates to feed the soil food web. If a field is fallow, you have to re-establish this web from scratch! Slow start

Interplanting is alternating your cash crop with supporting plants

My personal favorite winter cover crop: fava beans. Photo: Joan Pont

Reduce Weed Pressure

Cover crops can increase soil nitrogen and outcompete weeds

Winter annual rye produces chemicals which prevents other seed germination or stunts growth

Negative Allelopathy is chemical competition to inhibit nearby plants

The following spring, choose vegetable seedlings or or large seeded vegetables so they are not suppressed too! The allelopathy lasts for about 3 weeks after harvest

Cover crop of cereal rye and Crimson Clover

Short Cut

Plant Winter Rye in late fall. It tolerates frost. In the spring, cut short and leave remainder of plant on the ground as mulch (chop and drop)

Check out your nearest feed store and bring home a bale of straw for a deep layer of mulch, especially for paths. You won't have the benefit of root growth, but helps weed suppression

Spread thinly, a bale covers 2,000 square feet, so share with friends

Make Friends with a Farmer

Organic Fertilizer

Pasture Mowing

Instant Composting

Loves Scritches under the chin

Mix it up

Edible plants are delectable - to us and our garden visitors, and therefore hard to protect

You might think all are non-native, but some locally indigenous plants remain favorites

Huckleberries
Native Strawberry
Native blackberry
Gooseberry
Hazelnuts
Walnuts
Sages
Chia seeds

cnps.org edible native plants for the home garden. *Vitis californica* Roger's Red Grape

Happy Gardening

Reduce Pest Pressure

Reduce Weed Pressure

Reduce Disease Pressure

Improve Soil Structure

Improve Pollination

Improve Aesthetics

Happy Gardening

Reduce Pest Pressure - Invite insects

Reduce Weed Pressure - Cover Crops

Reduce Disease Pressure - Mix it up

Improve Soil Structure - Live roots

Improve Pollination - open flowers

Improve Aesthetics - Healthy plants

References

Silent Spring, Rachel Carson

Plant Partners Science Based Companion Planting Strategies for the Vegetable Garden, by Jessica Walliser

https://www.gardenista.com/posts/garden-decoder-insectary/

https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=24033

https://extension.illinois.edu/sites/default/files/beneficial_insects_from_the_garden_updated_2018.pdf

https://www.nrdc.org/stories/neonicotinoids-101-effects-humans-and-bees