

French Biointensive Gardening

Carla Hegeman Crim, Ph.D.
Horticulture and Natural Resources Educator
Cornell Cooperative Extension
of Delaware County



Biointensive vs. Biodynamic

Biointensive - centers around nutrient-rich soil that can support growing crops closer together, reducing the amount of resources and hands-on labor required. It incorporates compost, livestock, beneficial insectaries, and strives toward a closed-loop system on a homestead, whatever the size.

Biodynamic - a holistic practice where all things are considered living interrelated systems – animals, plants and the solar system. Includes elements of astrology and mysticism.

Permaculture - philosophy based on the fashioning of systems – agricultural and social – that are naturally sustainable and that utilize a local area's resources to their utmost.

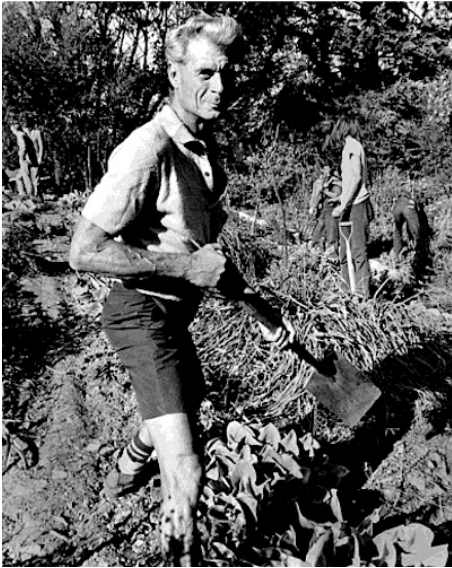
Is it really French?

Examples throughout history of intensive, sustainable, small scale agriculture:

- China – 4,000 years ago
- Greece – 2,000 years ago
- Mayans, Bolivia, Peru – 1,000 years ago
- American Colonists – 300 years ago
- French – 150 years ago



U.S. Biointensive Pioneers



Alan Chadwick - "High Priest Of Hippie Horticulture" combined Biodynamic and French Intensive concepts at University of California Santa Cruz in Northern California in 1960's, raised the technique to an art form some 40 years later.

John Jeavons - Director of the GROW BIOINTENSIVE Mini-Farming program for Ecology Action since 1972, author of How to Grow More Vegetables and Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible On Less Land Than You Can Imagine



Biointensive Features

Raised growing beds

Use of compost

Close plant spacing

**Synergistic planting of
crop combinations**

home
gardening



Carbon-efficient crops

Calorie-efficient crops

Open-pollinated seeds

**A whole, interrelated
farming system**

“mini-farming”

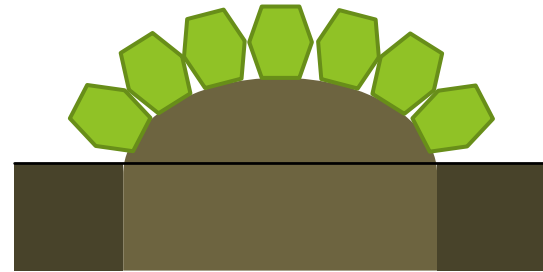


Biointensive Raised Beds



**3-5 ft wide x
3+ feet long**

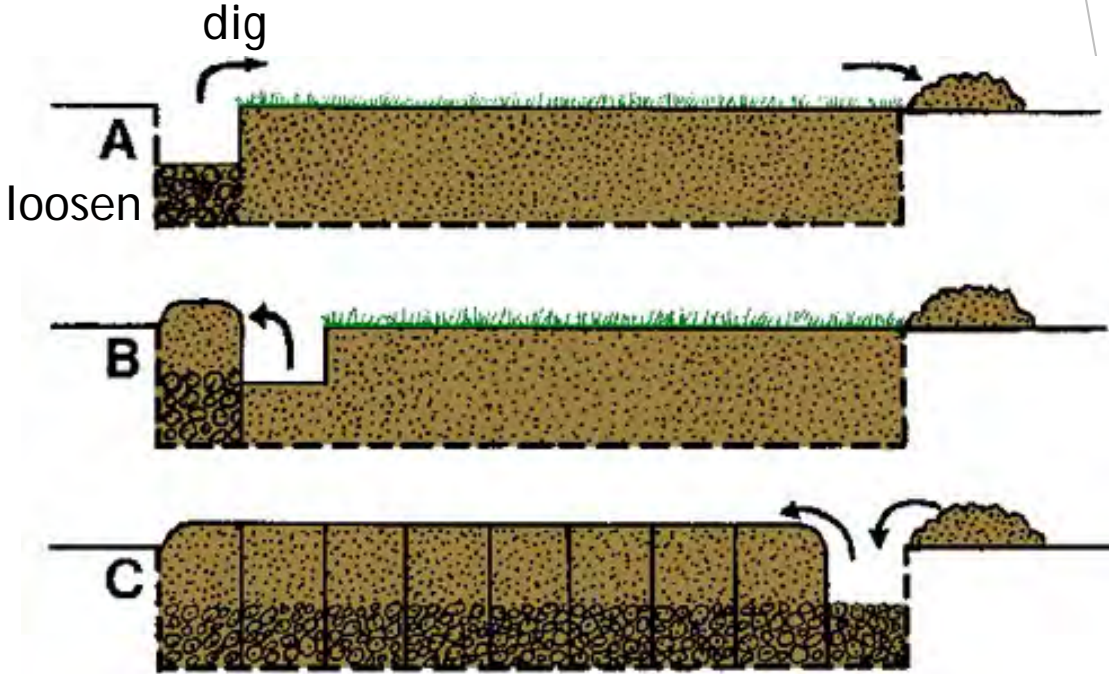
**Slightly raised and
rounded**



Advantages:

- Better aeration and drainage
- Naturally maintains paths, so less compaction
- Deeper penetration of roots into soil
- More surface area for planting
- Faster warming of soil in spring
- Encourages microbes and earthworms

Soil Preparation "Double Digging"



Double Digging “Cheats”

- Rototill beds at a shallow depth to eliminate weeds and loosen soil
- Plant a cover crop to loosen soil and smother weeds
- Mulch with plastic to kill weeds



Alternative Strategy 1: Lasagna Gardening

LASAGNA GARDEN LAYERS

Final Layer – Compost or manure.

Repeat steps 2-5 until your lasagna garden is about 2 feet deep.

Layer 5 – Your “brown” layer, shredded leaves, hay, shredded newspaper, and other similar material

Layer 4 – Your “green” layer, peat moss, manure, vegetable scraps, and/or lawn/garden clippings

Layer 3 – Your “brown” layer, shredded leaves, hay, shredded newspaper, and other similar material

Layer 2 – Your “green” layer, peat moss, manure, vegetable scraps, and/or lawn/garden clippings

Layer 1 – Cardboard or several layers of newspaper that have been soaked in water.



“Let the worms do the work”

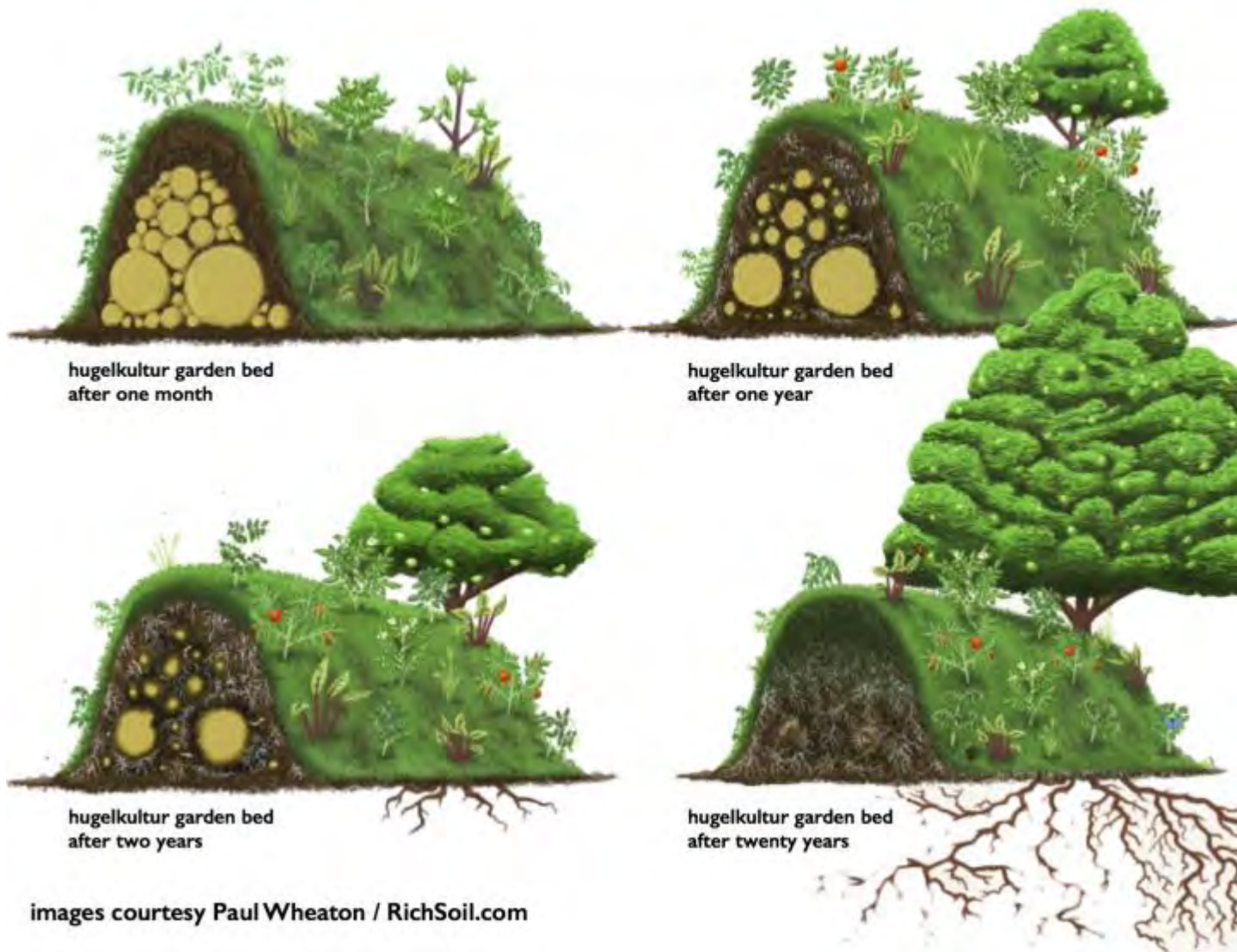
Alternative Strategy 2: Contained Raised Beds



Alternative Strategy 3: Straw Bale Gardening



Alternative Strategy 3: Hugelkultur



images courtesy Paul Wheaton / RichSoil.com

Compost: Importance & Usage

- Improves soil structure
- Provides nutrients
- Supports microbial activity
- Keeps garden debris and food scraps out of waste stream and preserves inputs for garden



Add ½” to bottom layer of bed during double digging

Apply ½” to beds before each growing season

Mix 50/50 with bed soil for seed starting mix



Biointensive Amendments

Do a pre-plant soil test!!!

If you need...

Everything – add manure

Nitrogen – add alfalfa meal

Potassium – add wood ash or crushed granite

Phosphorus – add phosphate rock or soft phosphate

Calcium – eggshells

Higher pH – add dolomitic lime or calcite

Lower pH – add gypsum

Adding Amendments

Sprinkle required amount on shaped bed

Insert spading fork in 2-4 inches at a slant

Add amendments one at a time

Nutrients will leach into bed naturally



Propagation

Goal – to maximize bed space during the growing season

Biointensive Strategy – have young plants at the right stage at the right time ready to plop into place



Most plants are started in flats outdoors or in greenhouse weeks before transferring to beds

Other Reasons to Transplant

- Avoid empty spaces in the bed caused by poor seed germination
- Establish living mulch faster because seedlings are already large; therefore they cover the soil sooner and the soil requires less water
- Use the healthiest seedlings to maximize yield
- Produce warm-loving seedlings earlier (with some protection) that will be ready to plant when the weather allows
- Bring the crop already in the bed to fuller maturity (producing more compost material and higher yields), while the seedlings are growing

Seed Flat Alternatives

Direct sow with proper spacing (plant a few “backups”)

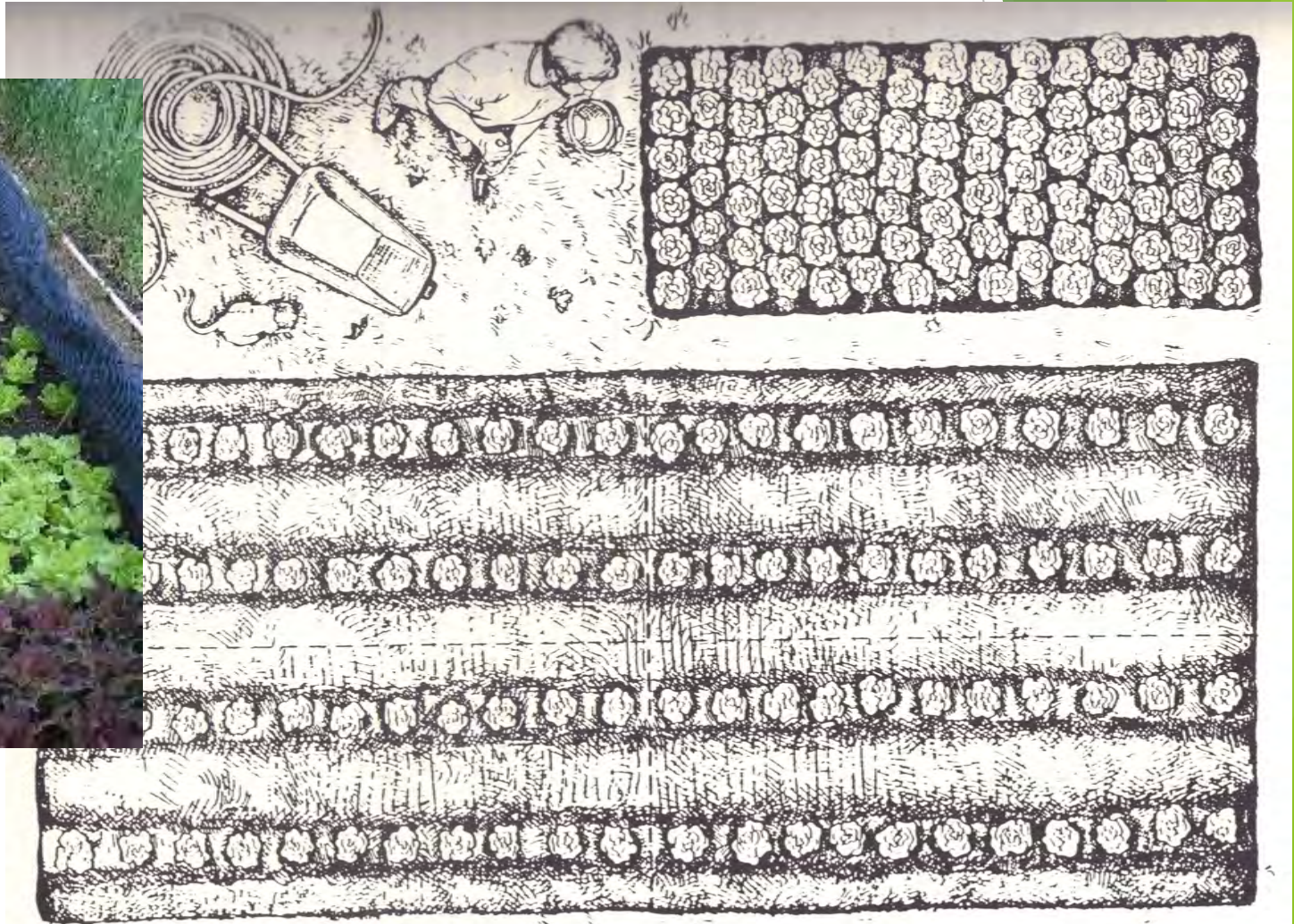
Purchase plants from nursery

Cold frame or winter sow in plastic jugs!!!

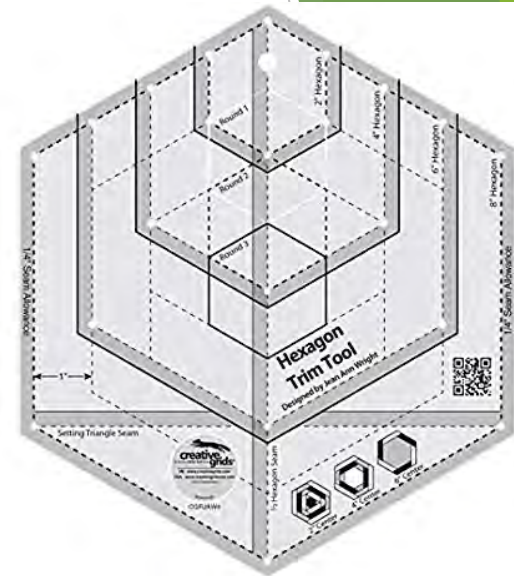
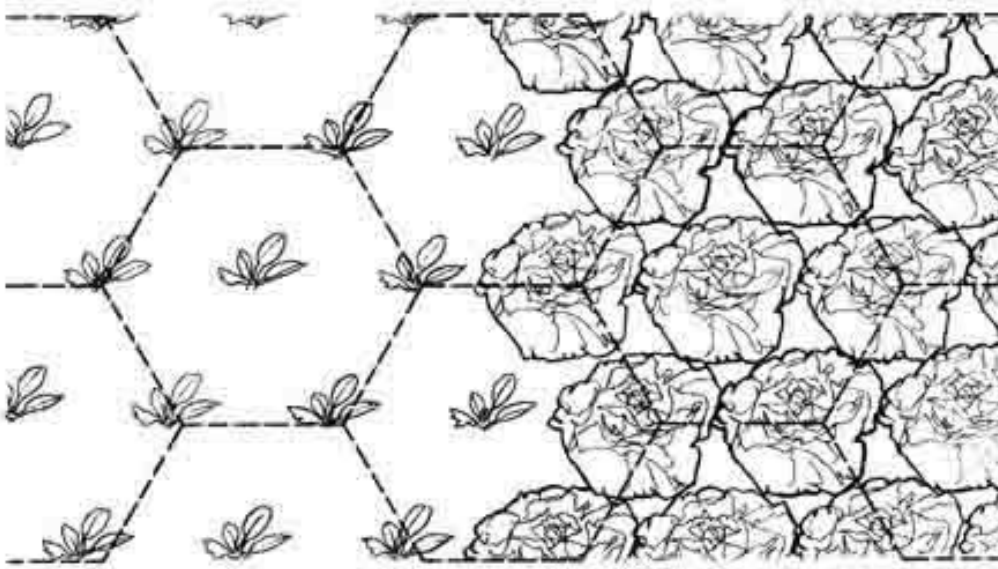


In-bed Spacing

Planting is offset to maximize space

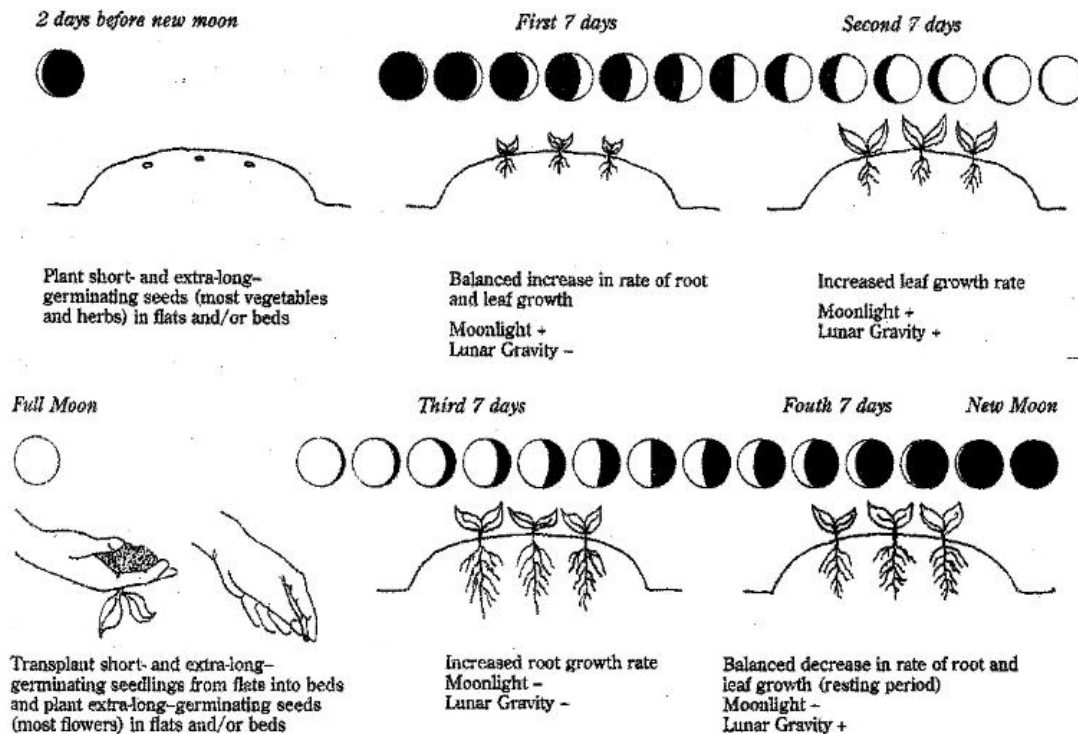


Spacing Tools



Transplanting

- Ideally overcast day or early evening
- Handle seedlings gently, touch as little as possible
- Keep as much soil around roots as possible
- Place in hole and water
- Pack soil lightly around the plant



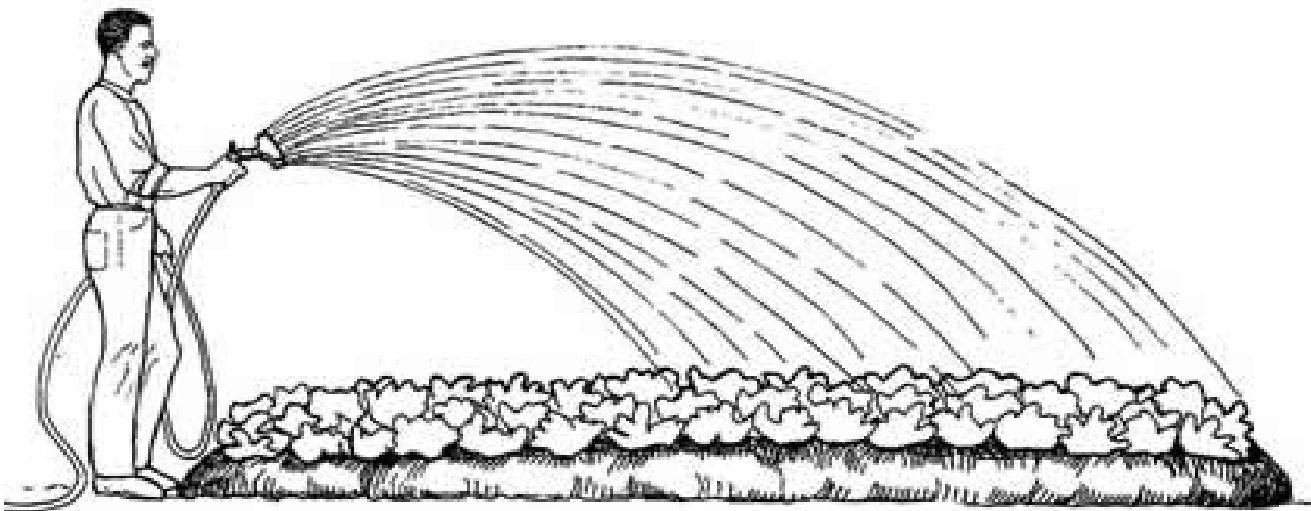
Watering

Gauge moisture by plant condition and finger test

If the rains aren't enough and you water your garden, make the water fall gently like raindrops instead of beating onto the plants or running over the soil.



Fan nozzle



Companion Planting

- *Choosing crops that are good neighbors* and encourage each other's growth
- Draws a diverse insect population to the garden by using plants of many types and colors that flower all-season long, encourages beneficials and pollinators
- Strong-scented plants, like marigolds, will help repel unwanted insects

Avoid putting plants in the same area or space that inhibit each other's growth



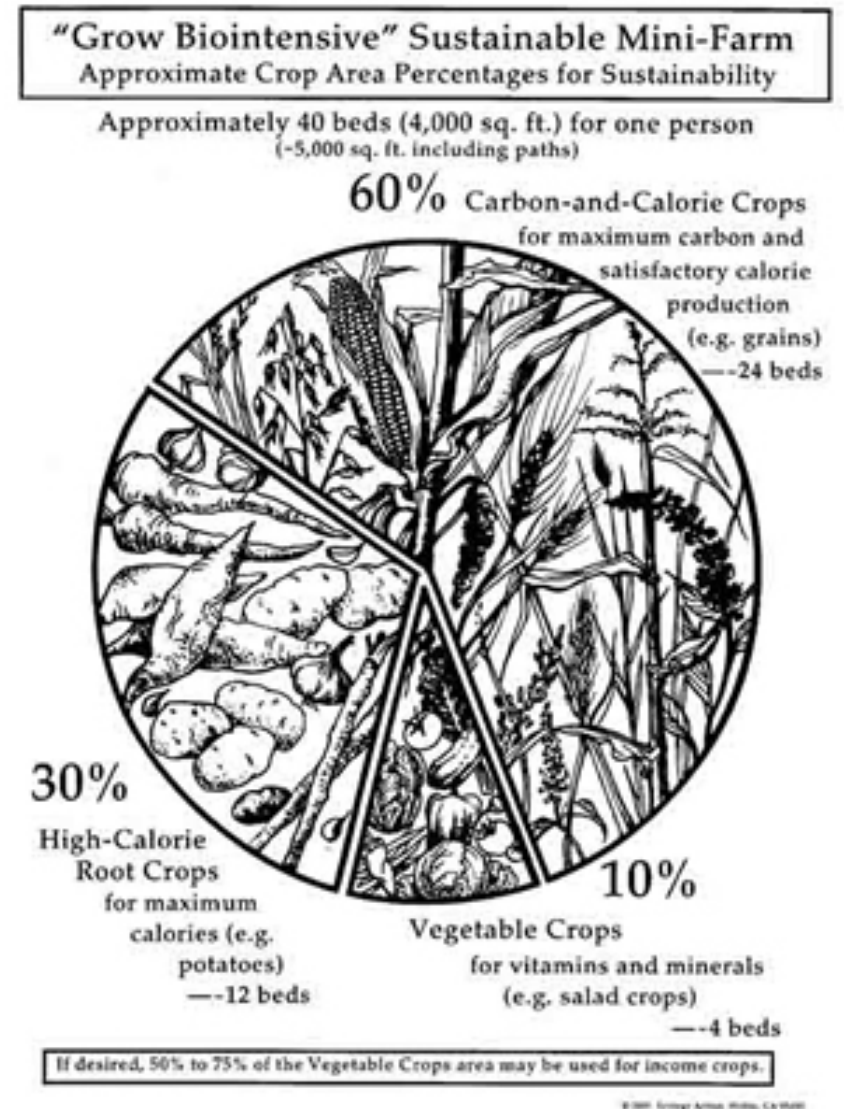
Mini-Farming Concepts

Carbon-efficient crops - Plants are grown for “brown material” to be made into compost

Calorie-efficient crops - Maximizes nutritional quality, important for self-sustenance

Open-pollinated seeds - Promotes genetic diversity and independence

A whole, interrelated farming system - farm itself is part of a greater ecosystem that should be thriving.







Birdsong Farm Community Garden



- Features:
- 4' x 36' raised beds
 - 5' wide pathways
 - Gathering space
 - Work tables
 - Storage shed
 - 3 bin compost system

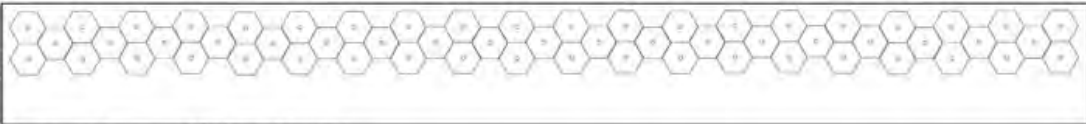


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Lettuce = 192

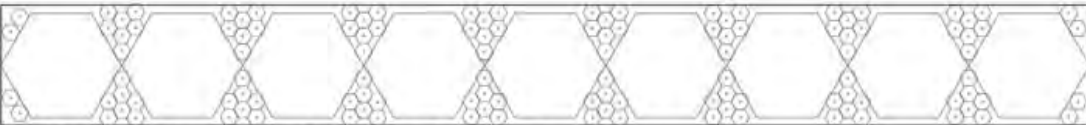
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Cucumbers = 60 (on trellis)

Carrots

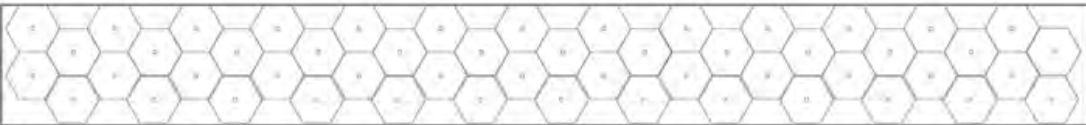
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Bush Winter Squash = 18 (9 hills of 2 plants)

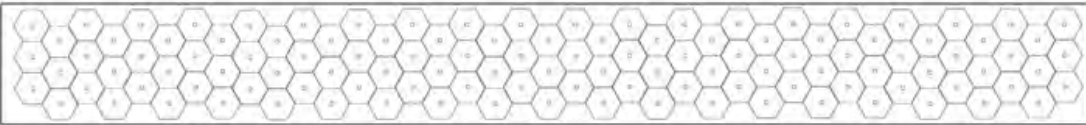
Bush Beans = 120

19



Asparagus = 52 crowns

21



Swiss Chard 117

23



Mixed Flowers





6 weeks later...









12 Ways to Reduce (or Totally Eliminate) Pesticides in the Garden

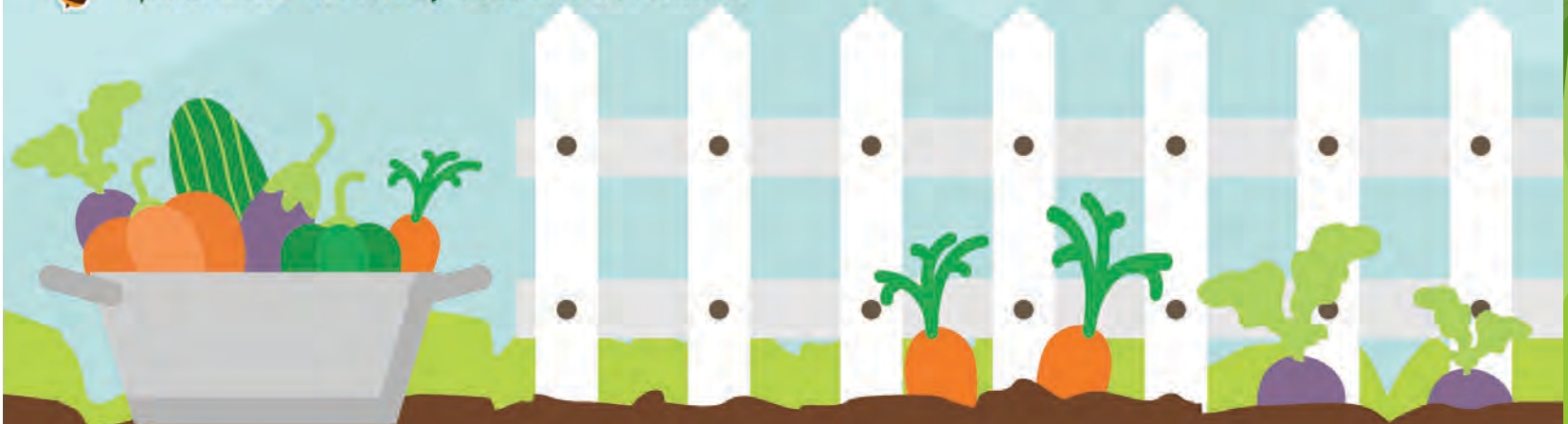
Amid growing concerns about the effects of chemicals on human health and the environment, many gardeners are opting to leave the pesticides on the shelf. That doesn't mean standing idly by while hungry insects and nasty pathogens wreak havoc on their crops. By utilizing good growing practices and chemical-free defenses, it is possible to raise healthy flowers and vegetables without pesticides.

What is a pesticide?

Pesticide law defines a "pesticide" as: *Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.*



Did you know? Even organic, over-the-counter pesticides can have adverse effects on important pollinators like honey bees and butterflies.



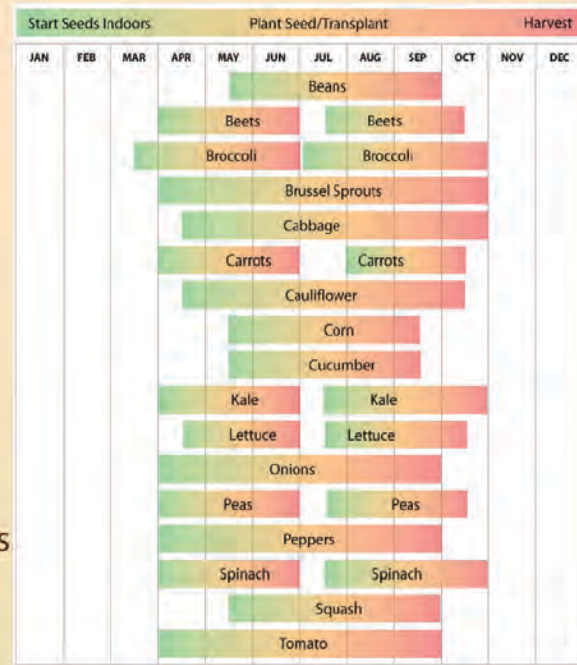


1. Start from the ground up

Healthy soil is the key to successful gardening. When soil is the proper pH and has the correct nutrient balance, plants are more likely to thrive and use their own defenses to ward off pests. Organic matter and beneficial soil micro-organisms are important as well.

2. Timing is everything

Plants are much healthier and resistant to pests and disease when grown in the proper season. Cole crops like broccoli and kale love the coolness of early spring, but suffer in the heat of July. Tomatoes and peppers are just the opposite - they sulk when planted too early, but thrive in heat. Plan your garden so that plants go in and out at the appropriate time.



3. Know your pest

Proper identification of the culprit will allow for informed management strategies. Understanding the life cycle of the insect or pathogen will help you decide if treatment is even in order. For example,

some insects only cause damage for a brief part of the growing season. Sensitive plants can be protected during this window, or grown during a different period.

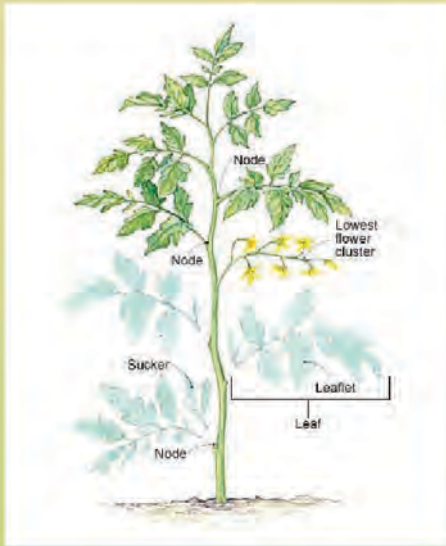
Did you know? CCE Delaware offers FREE soil pH testing and pest identification services. Samples can be submitted in jars or baggies to our Hamden office, or clear photographs of pests/plants can be emailed to ceh27@cornell.edu. For a more complete soil nutrient analysis, we work with an Ithaca-based laboratory that charges approximately \$15 per sample.



4. Prune properly

For certain varieties, pruning is critical for plant health. Removal of un-needed leaves and stems increases air flow, reducing the risk of fungal diseases. It also allows the plant to focus energy on fruit production, and makes for easier identification and removal of insect pests. For vining plants like indeterminate tomatoes and cucumbers, staking or trellising further reduces the risk of disease.

Even with plants that aren't typically pruned, it is always beneficial to remove old, yellowing leaves. Note: Diseased leaves should never be composted as spores can persist in finished compost.



5. Diversify plantings

Mix vegetables, flowers and herbs for increased health and production. Companion planting is the practice of combining species to enhance growing conditions. Good pairings include

tomatoes + basil, corn + peas, and spinach + strawberries. Flowers like marigolds and Nasturtiums are known to repel pests. Other flowers bring beneficial insects to the garden. Plants with different growth habits make good companions as well. For example, beets (roots underground) grow well with lettuce (leaves above ground).





6. Bring in barriers

A simple covering will keep chewing insects off your plants. In the early season, a thicker, non-woven material gives the added bonus of providing warmth to plants. Later in the season, a lightweight tight-mesh netting allows for needed airflow and water penetration.



7. Plan for backup

Achieve success through succession planting! If you have the space, plant a later crop of susceptible crops like squash and cucumbers. That way, when the first crop starts to decline, the second crop is producing. Also, certain insect pests may no longer be active, ensuring continued production for the remainder of the season.

8. Rotate crops

Planting the same (or even related) plants in the same area of the garden year after year can cause pests and diseases to build up in the soil. Rotating crops not only decreases these problems, but can actually improve the soil and maximize productivity.

Did you know? A commercial applicator's license is required to spray pesticides anywhere other than one's own property. Therefore, in school or community gardens, it is illegal for unlicensed volunteers or supervisors to use pesticides (even organic and home remedies).



9. Water wisely

Plants need ample water, especially when they are first planted. Overwatering, however, is a big culprit in the proliferation of fungal diseases. Water morning to mid-day so that plants have ample time to dry before nightfall. Also, avoid overhead watering to reduce transmission of spores by splashing. Consistent watering during periods of drought reduces stress and increases resistance.



10. Scout daily

Pests and diseases are best dealt with in the earliest stages. Stroll around the garden every day, if possible and look for symptoms of disease or indications of insects. Removal of infected tissue goes a long way towards slowing disease progression. Insects can be removed by hand or even thwarted somewhat by a strong spray with the water hose.



11. Plant resistant varieties

In the swampy summer months, blights and mildews make an ugly appearance on sensitive plants like squash, cucumbers, and tomatoes. Every year, seed companies introduce new and improved varieties that have been bred (not engineered) to resist fungal diseases.

Plant	Variety	Source	Resists
Cucumber	<i>SV4719CS</i>	Johnny's Selected Seeds	Downy Mildew
Yellow Squash	<i>Gold Star</i>	Johnny's Selected Seeds	Powdery Mildew
Zucchini	<i>Dunja</i>	Territorial Seed Company	Powdery Mildew
Slicing Tomato	<i>Brandywise</i>	Fruition Seed Company	Early & Late Blight
Cherry Tomato	<i>Jasper</i>	Johnny's Selected Seeds	Early & Late Blight

12. Accept imperfections

Even with moderate damage, certain plants can produce a perfectly healthy crop. For example, flea beetles will make holes in the leaves of eggplant, but will generally not damage the fruit itself except in the case of severe infestation. As long as the plants are overall healthy and productive, ugly foliage can be overlooked.







