

VEGETABLE GARDENING

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THE 5 "S" GARDEN PLANNING LIST

**Site
Selection**

**Soil &
Fertility**

**Selecting
Plants**

Scheduling

Sources



SITE SELECTION

Make sure the site...

- Fits the space
- Is accessible
- Meets the gardener's needs
- Has adequate light for crops
- Has access to water



Site Selection

LIGHT AVAILABILITY



**Site
Selection**

GARDEN DESIGN

In-Ground/ Rows

- Less Infrastructure
- Larger space to maintain
- Larger crops

Beds/ Raised Bed

- Easier Access
- Intensive spacing

Containers

- Small Spaces
- Limited to smaller crops


**Soil &
Fertility**

TEST AND AMEND

Test soil regularly

Amend only as indicated by soil test

Amend with organic matter for soil texture, microbiology, and nutrients

Commerical fertilizers are OK if needs are high

Harvesting and annual removal removes nutrients



Soil & Fertility

NUTRIENTS AND SOIL pH

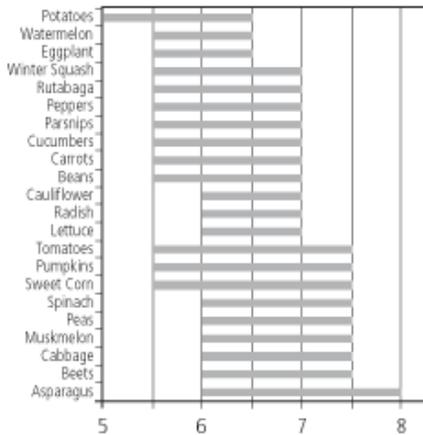
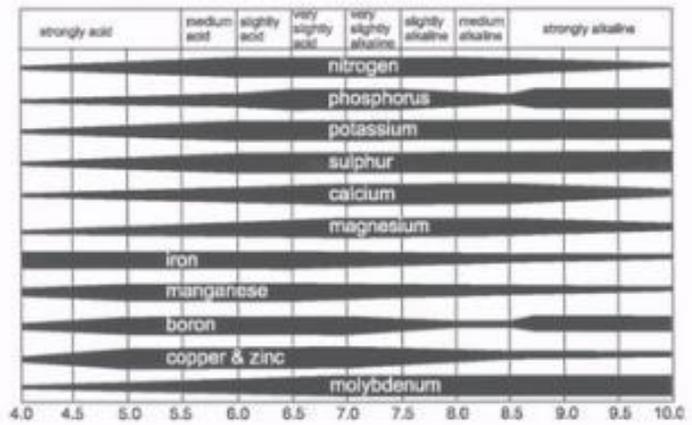


Figure 1. Ideal Soil pH ranges for common vegetables.



Soil & Fertility

Mother Earth Knows, but She's Not Tilling

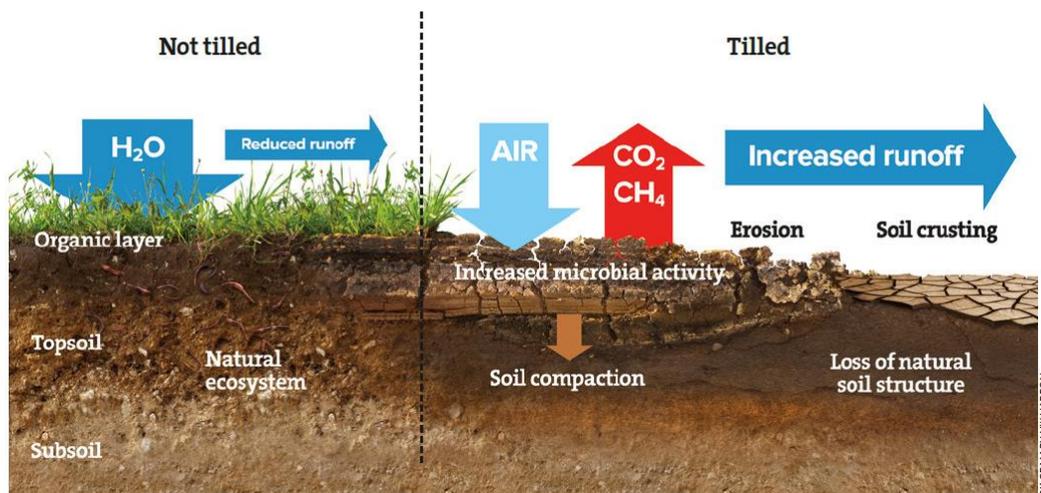


DIAGRAM BY NIK HARRON



Soil & Fertility

URBAN SOILS

Lead or Heavy Metals

- Paint on structures
- Pipes
- Leaded gasoline

Chemicals from Previous Use

- Industrial/Commercial
- Waste Sites

General Source	Examples of Previous Site Uses	Specific Contaminants
Paint (before 1978)	Old residential buildings; mining; leather tanning; landfill operations; aircraft component manufacturing	Lead
High traffic areas	Next to heavily trafficked roadways or highways; near roadways built before leaded fuel was phased out	Lead, zinc, polycyclic aromatic hydrocarbons (PAHs)
Treated lumber	Lumber treatment facilities	Arsenic, chromium, copper
Burning wastes	Landfill operations	PAHs, dioxins
Contaminated manure	Copper and zinc salts added to animal feed	Copper, zinc
Coal ash	Coal-fired power plants; landfills	Molybdenum, sulfur
Sewage sludge	Sewage treatment plants; agriculture	Cadmium, copper, zinc, lead, persistent bioaccumulative toxins (PBTs)
Petroleum spills	Gas stations; residential/commercial/industrial uses (anywhere an aboveground or underground storage tank is or has been located)	PAHs, benzene, toluene, xylene, ethyl benzene
Pesticides	Widespread pesticide use, such as in orchards; pesticide formulation, packaging and shipping	Lead, arsenic, mercury, chlordane and other chlorinated pesticides
Commercial/industrial site use		PAHs, petroleum products, solvents, lead, other heavy metals (such as arsenic, cadmium, chromium, lead, mercury and zinc)
Dry cleaners		Stoddard solvent and tetrachloroethene
Metal finishing operations		Metals and cyanides



Soil & Fertility

URBAN SOILS

Test Soil for Contaminants

Check with health department

Major risk is from residue on plants, not uptake

Use raised beds/containers in contaminated areas

<http://bit.ly/2o4RB15>

REUSING POTENTIALLY CONTAMINATED LANDSCAPES: Growing Gardens in Urban Soils

This fact sheet provides communities and individuals with general urban gardening information about:

- Common contaminants that can be found in urban soil.
- Ways to identify contaminants and reduce exposure.
- Improving soils and growing plants in mildly contaminated soil.
- Additional resources and technical assistance.

Introduction

Communities throughout the country are turning to urban agriculture and gardening as a reasonable option to increase their access to healthy, nutritious, and low-cost produce. Some of the sites that communities are using for urban gardens were previously home to industrial and commercial operations. A garden on abandoned land can become a new community asset by improving the visual look of a neighborhood and potentially increasing nearby property values. Community gardens provide many benefits, including healthier lifestyles by increasing activity levels, providing fresh produce, growing community pride, and starting social interactions and cooperation among people.

For communities interested in gardening on a site that might be contaminated, it is important to first determine the health and suitability of the soil at the site. It is a common gardening practice to test soil for characteristics such as pH and nutrient availability. When creating a garden on land with an industrial or commercial history, it is highly recommended that communities consider the site's land use history and test the soil accordingly for potential contamination. Knowledge of soil health and potential contamination are keys to helping communities identify and correct problems so that each urban garden is safe and productive.

The possibility of contamination at a garden site should not keep you from planning an urban garden there. This fact sheet presents steps that you can take to find out and address potential contamination at your site to help create a safe and healthy garden for your community.

More information for the urban gardener on soil science, soil amendments, plants, contaminants and their health effects, and additional links is available on EPA's CLU-IN website: www.clu-in.org/ecotools/urbangardens.cfm.

U.S. Environmental Protection Agency
Office of Superfund Remediation and Technology Innovation



**Selecting
Plants**

Choose plants
that fit your
needs

Plants should
be able to grow
in the area

Disease
Resistance

Consult
extension
growing guides
for assistance



**Selecting
Plants**

PLANT GENETICS

Heirloom

Open-
Pollinated

Hybrid

GMO



**Selecting
Plants****PLANT GENETICS****Open Pollinated**

- generally refers to seeds that will "breed true." When the plants of an **open-pollinated** variety self-pollinate, or are pollinated by another representative of the same variety, the resulting seeds will produce plants roughly identical to their parents.

**Selecting
Plants****PLANT GENETICS****Heirloom**

- a plant variety that has a history of being passed down within a family or community, similar to the generational sharing of heirloom jewelry or furniture. *An heirloom variety must be open-pollinated.*



Selecting Plants

PLANT GENETICS

Heirloom Pros

Choice of interesting/exciting varieties

Interesting histories

Can be adapted regionally

Heirloom Cons

Often lack disease/pest resistance

May not grow well in different region

Unpredictability/ low yield



Selecting Plants

PLANT GENETICS

Hybrid

- **Hybridization** is a controlled method of pollination in which the pollen of two different species or varieties is crossed by human intervention. Hybridization can occur naturally through random crosses, but commercially available hybridized seed, often labeled as F1, is deliberately created to breed a desired trait.



Selecting
Plants

PLANT GENETICS

Hybrid Pros

Increased disease/pest
resistance

Hybrid vigor/ higher
yields

Often adaptable to
many regions

Hybrid Cons

May lack interest factor
of heirlooms

May not grow well in
different region

Inconsistency with
saved seed



Selecting
Plants

PLANT GENETICS

GMO

- ***Genetically Modified Organism.*** A term used to describe an organism where individual genes for desired traits are introduced through direct introduction rather than cross-breeding. Due to confusion and misuse of the term, a better term is ***Genetically Engineered.***



**Selecting
Plants**

PLANT GENETICS

GMO Pros

High potential for solving evolving issues

Provides rapid means to respond to diseases and other issues

Can potentially reduce use of pesticides

GMO Cons

Many people still concerned/fearful

Requires thorough study for safety and effectiveness

Inconsistency with saved seed



**Selecting
Plants**

PLANT GENETICS

GMO Crops

- Not available to home gardeners
- Not found in any garden catalog or seed rack
- Only a handful of commodity crops
- Hybrids are not GMOs



Scheduling

PLAN PLANTING FOR LONG-TERM

Plan for multiple harvests

Start seeds at appropriate time for area

Don't rush to plant

Soil/air temps are key for planting times

Planting time can often affect pests

Successive planting can make harvests longer and easier



Scheduling

SUCCESSION PLANTING



Extends harvests through multiple seasons

Makes good use of space

Three types:

- **Succession planting:** Planting cool/warm and short/long season plants consecutively in the same space
- **Relay planting:** Multiple timed plantings of a single crop in different spaces
- **Maturity planting:** Planting different cultivars at the same time that mature at different times



Scheduling

Early Season Crops

- Early Beets
- Early Cabbage
- Lettuce
- Onion Sets
- Peas
- Radishes
- Early Spinach
- Mustard
- Turnips

Long Season Crops

- Beans
- Cabbage
- Celery
- Sweet Corn
- Cucumbers
- Eggplant
- Muskmelons
- Peppers
- Potatoes
- Pumpkin
- Squash
- Swiss Chard
- Tomatoes
- Watermelon

Late Season Crops

- Bush Beans
- Beets
- Broccoli
- Chinese Cabbage
- Carrots
- Cauliflower
- Endive
- Kale
- Kohlrabi
- Lettuce
- Radishes
- Spinach
- Turnips



Scheduling

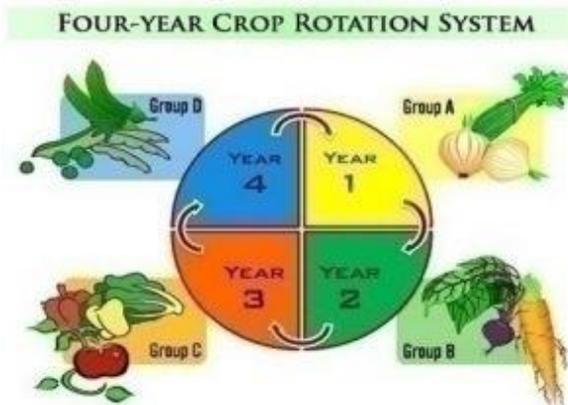
CROP ROTATION

By family

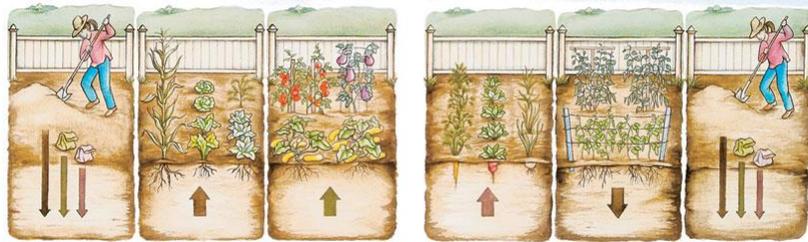
- Good for pest reduction

By crop structure

- Roots vs fruits vs leaves – different needs



Scheduling



THE BENEFITS OF CROP ROTATION

- 1 Reduces pressure from pests and diseases.
- 2 Prevents exhausting soils.
- 3 Can help with weed control.

Sources

SOURCES OF INFORMATION

Seek trustworthy sources of garden info

Investigate dubious claims

Avoid myths and fake info on social media

Ask questions

Sources

SOURCES OF INFORMATION

Seek trustworthy sources of garden info

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Ask questions



Extension Master
Gardener



@ExEMG



ExtensionMasterGardener

EXTENSION



**MASTER
GARDENER**

People, Plants and Partnerships





The Garden Professors (page)



The Garden Professors blog (group)



gardenprofessors.com



MAKING THE MOST OF YOUR GARDEN SPACE



Raised Bed Gardening



Square Foot Gardening



Season Extenders



Interplanting



WHY RAISED BEDS?

Soil warms earlier in the spring and stays warm later in the fall, allowing for season extension

Can be used where native soil is too poor for gardening or where drainage is poor (clay soils)

Dense planting reduces weeds

Easier access for those with mobility limitations or physical impairments



RAISED BED BASICS

May be 6-8 inches above ground or higher

Recommended width is 4ft

Can be constructed from many materials

- Landscape timbers
- Concrete blocks
- Lumber
- Landscape edging stone

Can be simply mounded soil

Filled with rich, fertile soil and organic matter

Plants are spaced much closer than “conventional” rows



RAISED BED DESIGNS



RAISED BED CONSIDERATIONS

Extra watering needed in hot summer months due to increased drainage

Good mulching (organic and inorganic) can reduce weeds and water loss

Good sanitation is needed due to closeness of plants

Be aware of any leaching from materials used in construction



INTENSIVE PLANTING – SQUARE FOOT GARDENING

Intensive spacing model

A certain number of plants (species specific) of one type are evenly spaced in each 1ft x 1ft (square foot) section of a raised bed

No two adjoining squares have the same plants

Beds are usually 4ft x 4ft squares, but can be longer (4ft x 8 ft, etc.)



WHY SQUARE FOOT GARDENING?

Great for small spaces or those with limited time

Succession planting is easy – once a square is empty plant something else

Diverse plant population can help reduce disease and pest problems

Crop rotation is easy



SQUARE FOOT DESIGNS



SQUARE FOOT PLANTING

1 per sq ft

- Cole Crops
- Tomatoes
- Potatoes
- Peppers
- Squash
- Cucumber

4 per sq ft

- Herbs
- Chard
- Corn
- Large Greens
- Most Flowers
- Head Lettuce

9 per sq ft

- String Beans
- Peas
- Garlic
- Beets
- Turnips
- Spinach



INTERPLANTING

Plants take advantage of different growing times and areas

- Plant fast growing plants around slower growing plants to double crop
- Use plants that have different growth habits to save space
- Plant warm season crop between remaining cool season crops
- Classic example: Three sisters – Corn, Beans and Squash



ORGANIC GARDENING

Gardening practice using all organic (natural) inputs

Combines effective IPM practices, organic pest control, and organic fertility practices

Many gardeners practice organic techniques over concern of chemical inputs and human health

Studies show that organic produce not necessarily safer/better than conventional



ORGANIC GARDENING

Soil Fertility

- Soil testing allows you to know what nutrients are actually needed
- Use organic sources of nutrients such as composts and manures
- Cover crops can be used to reduce diseases and add nutrients



General nutrient properties of composts :

Nutrient content (dry weight basis) :

Type	% nutrient content		
	N	P	K
Poultry manure	2 - 4	1 - 3	1 - 3
Feedlot manure	2 - 3	1 - 1.5	1 - 2
Dairy manure	1 - 2	0.5 - 1.5	1 - 2
Urban yard waste	1 - 1.5	0.2 - 0.5	0.5 - 1.5
Crop residue	1.5 - 2.5	0.2 - 0.5	1 - 2

Forms of N present :

Organic N > 90%

Mineral N (NH₄-N, NO₃-N) < 10%



FOOD SAFETY AND SOIL AMENDMENTS

Composts and manures can be a source of human pathogens

Crops eaten raw and in contact with soil greatest risk for contamination

Post application waiting harvest periods

- 120 days – crops in contact with soil
- 90 days – crops not in contact with soil



ORGANIC GARDENING



Pest Control

- Rely heavily on IPM practices of prevention
- Some chemicals are listed as organic, if needed
- Attract or release beneficial insects to help control pests



MULCHING

Reduces weed pressure and water loss

Use straw, newspaper, woodchips, etc.

Do not incorporate into soil



MULCHING



COVER CROPS



VS



BENEFITS OF COVER CROPS

Reduce Soil
Erosion

Adds Biomass
Which Improves
Soil Structure

Adds Nutrients:
Ave. 100 lbs. N
Per Acre Per Year
for Legumes

Improve
Microbiotic
Activity

Weed Reduction
"Smother Crop"

Suppress
Disease: Reduces
Splashing of Soil

Capture Leftover
Fertilizer

Reduce
Evaporation of
Soil Moisture

Reduce Soil
Temperature
Fluctuations

Habitat For
Beneficial Insects



NEGATIVES OF COVER CROPS

Can Keep
Soil Cool &
Wet Later
in Spring

Some Are
Hard to Kill

Can Tie Up
N 4-8
Weeks
After
Tilling

Fast &
Excessive
Spring
Growth



SEASON EXTENSION

Extends season through early and late planting

Some techniques may help with insect pests

Variety of options



Floating Row Cover



Row Cover Tunnel



Plastic Low Tunnel



High Tunnel



Cold Frame



Cloches



VERTICAL GARDENING

Grow Up instead of Out

Make use of vining crops

Avoid “bush” type plants

Utilize space underneath plant for interplanting







BACKYARD FARMER GARDEN



PAK CHOI ASIAN DELIGHT F1 2018 EDIBLE WINNER



- Slow to bolt
- Forms small to mid-size (5-7") heads
- Tasty, tender white rib and dark green, textured leaves.
- High yield from slow bolting



PEPPER CAYENNE RED EMBER F¹ 2018 EDIBLE WINNER



- Early to mature
- Spicy fruit with just enough pungency for interest
- Produces large number of rounded end fruits on durable, medium sized plants



PEPPER HABANERO ROULETTE F1 2018 EDIBLE WINNER



- No Heat – nice citrusy habanero flavor
- Produces large uniform fruit
- Early producer
- Product 100+ fruit in a season



TOMATO RED RACER F1 2018 EDIBLE WINNER



- Cocktail tomato
- Uniform fruits
- Large yields
- Good sweet/acid balance
- 7-10 days earlier



TOMATO, VALENTINE F1 2018 EDIBLE WINNER



- Grape tomato
- Very sweet taste
- Large yields
- Matures earlier
- Meaty firm flesh resembles a Roma tomato but smaller



SWEET CORN AMERICAN DREAM 2018 EDIBLE WINNER



- Super sweet, very tender kernels
- High germination
- Early to produce



KEEPING IN TOUCH



@UrbanAgGuru



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urbanag.guru



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