Organic Gardening

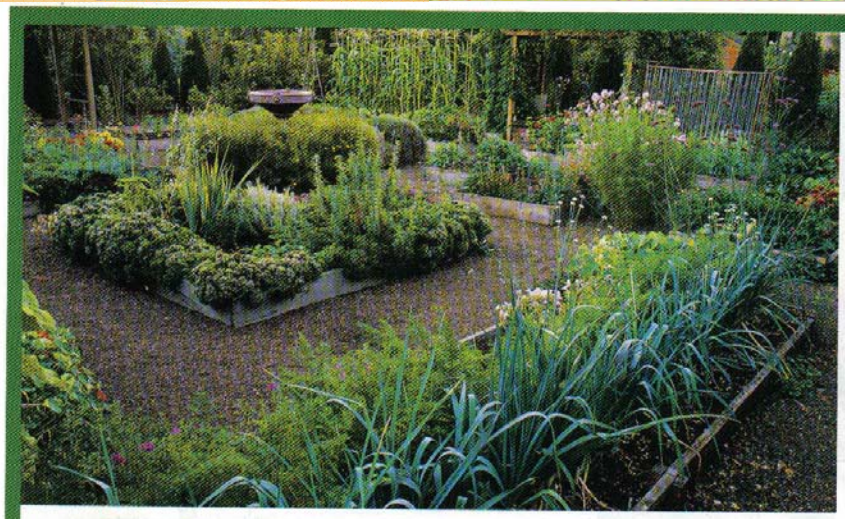
Master Gardeners

El Dorado County

UCCE Cooperative Extension

What is organic gardening – goals, methods, benefits

- Organic methods, planting strategies
  - Raised beds, double digging
  - Cover crops, green manure
  - Crop rotation, succession planting, interplanting
  - Companion planting
  - Best planting times
- Strategies for pest, disease, and critter control
  - Identify damage
  - Prevent problems with good practices: choose pest resistant, disease resistant plants; attract beneficials
  - Mechanical, physical methods
  - Use organic sprays, dust, etc
- Weed control strategies
  - Mulching
  - Solarization
  - Other



IT'S BED TIME

REAP THE BENEFITS OF RAISED BEDS. *Written by* **THERESE CIESINSKI**

When we at OG hear about a faster, smarter, or easier way to grow vegetables, you can bet we try it. But of the myriad techniques out there, we've concluded that for saving time, labor, and our aching backs, nothing beats the age-old practice of growing crops in raised beds.

A raised bed is simply a planting area where the soil is mounded a few inches above ground level. This mound may be enclosed to prevent erosion, or left open. Planting in elevated beds offers several important benefits:

- Plants are physically easier to access.
- Since all the plants in the beds are within arm's reach, you can grow more than when you plant in rows.
- The soil drains better, so plants don't stay soggy.
- Soil warms up faster in spring and stays warm well into fall, extending your growing season.
- You won't step on the soil and risk compacting it.

Bed Basics

Length and width. A raised bed can be any length you need, but make it no wider than 4 feet, so you can reach into its center comfortably from any side without stepping into it.

Height. Beds can also be mounded as high or as low as you want, but anything more than 18 inches tall needs a foundation and support to keep it from toppling. A bed 6 inches tall gives you, in most cases, all the benefits listed above.

Framing. Raised beds don't have to be framed; the simplest are mounds created by digging out and piling up the soil from the areas around the beds. But mounded beds erode quickly, so you may need to rebuild them every spring.

Fill. To fill the beds, either bring in fresh soil or fluff up the soil within the bed and add bulky amendments such as compost or well-aged manure. Or you can dig up the soil surrounding the beds and add it to the beds. This way, you'll be creating pathways around the beds at the same time as you're filling them. Fill the beds to the level of the frame you've built (or 6 inches high, if there's no frame). The soil will settle over time.

raised bed tips

- Strengthen the corners of the bed by nailing or screwing blocks where the pieces meet.
- Allow at least 3 feet between raised beds to fit a wheelbarrow or cart.
- "Fluff" the soil with a garden fork before planting.
- Don't use railroad ties oozing creosote, or pressure-treated lumber. If you're building with treated material, and you don't know whether it's harmless, don't grow vegetables in that bed.

LEE ANNE WHITE; GARDEN DESIGN BY MARGARET DE HAAS VAN DORSSER

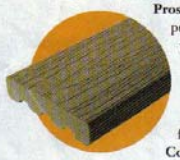
FRAMING MATERIALS

Stone, rock

Pros: They last forever, or until you move them. Natural and attractive, stone raised beds are one with the landscape. Stone weathers well, becoming more beautiful with time. A no-cost option if the rocks are collected from your property.

Cons: Not for the gardener who loves perfect symmetry and order. If you don't have enough rocks lying around, buying stone can be expensive.

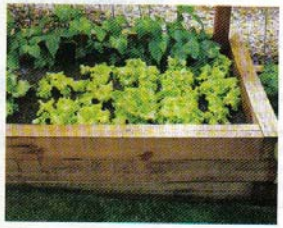
Recycled plastic/wood composite



Pros: It lasts indefinitely. It doesn't crack, peel, splinter, or rot, and it won't bow out under soil pressure as molded plastic boards can. It can be drilled or nailed to attach netting, row covers, trellises, etc.

OG Editors' Choice: We recommend recycled plastic/wood composite lumber for its longevity and ecofriendliness.

Cons: Costs 30 to 40 percent more than wood lumber.



Wood (cedar, pine, redwood)

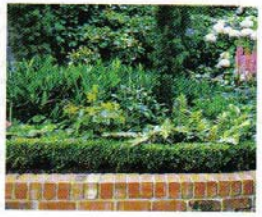
Pros: Boards are lightweight. The look is natural and attractive. Depending on your climate, pine lasts about five years; redwood and cedar last longer. Can be drilled or nailed to attach netting, row covers, trellises, and the like.

Cons: Wood eventually rots where it touches the soil and needs to be replaced. It can also splinter, warp, and crack. Redwood and cedar can be expensive.

Cinder block, concrete block, brick, pavers, and other manmade "stone"

Pros: Long lasting. The consistent size and shape of the material makes it easy to work with. Cinder block and concrete block are economical choices. Brick and some man-made stone are attractive.

Cons: Brick and some manmade stone can be expensive. Cinder block and concrete block are practical but not very attractive choices. ■

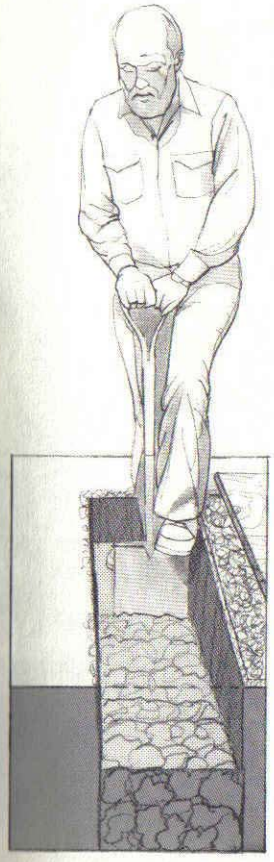


For information on raised bed kits, visit *OrganicGardening.com*.

GARDEN PHOTOS, FROM TOP: ALAN & LINDA DETRICK (GARDEN DESIGN BY DEAN RIDDLE); MARK TURNER; ANDREW DRAKE; ALAN & LINDA DETRICK (GARDEN DESIGN BY ROBYN & DON CANNON); RAW MATERIALS: MITCH MANDEL

portant in the double-dig when all
dug to an equal depth. The blade of
the soil at less of an angle and
your shovel. This means the sides of
rectangular or even diagonally outward
ve penetration and water flow.
ground when the soil is evenly

3.



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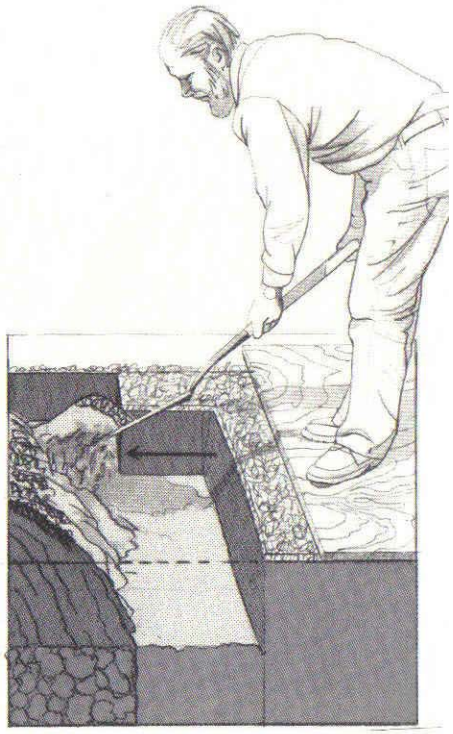


(in the case of clays). Soil is too wet when it sticks to the spade as you dig.

"Double-digging" is the term used for the process of preparing the soil two spades deep (about 24 inches). To begin, mark out a bed 3–5 feet wide and at least 3 feet long. Most people prefer a bed 5, 10 or 20 feet long but the maximum is up to you. To double-dig, remove the soil from a trench 1 foot deep

3. *In good soil:* While standing in trench, loosen soil an additional 12 inches with a spade by digging into its full depth, lifting soil out on spade pan and then tipping pan downward so that the loosened, aerated soil slides back into trench. Mix up soil layers as little as possible.

Cover Crops and Green Manure

- Summer crops
  - Buckwheat
  - Clovers
  - Oats
- Winter crops
  - Fava beans
  - Bell beans
  - Austrian peas
  - Mustard

Mulching

- For established plants, or transplants, do not apply too close – leave 1”
- May delay mulching until soil warms

1. Mulch – surface
2. Compost – decomposed mulch
3. Humus – really broken down

Good mulching materials

- Compost
- Pine needles
- Grass clippings
- Sawdust – aged
- Shredded leaves
- Black plastic, clear plastic
- Wood chips
- Paper – news print, cardboard
- Crop residues
- Straw

Crop rotations

Plant families to be rotated:

Solanaceae family – tomatoes, eggpplant, peppers, potatoes

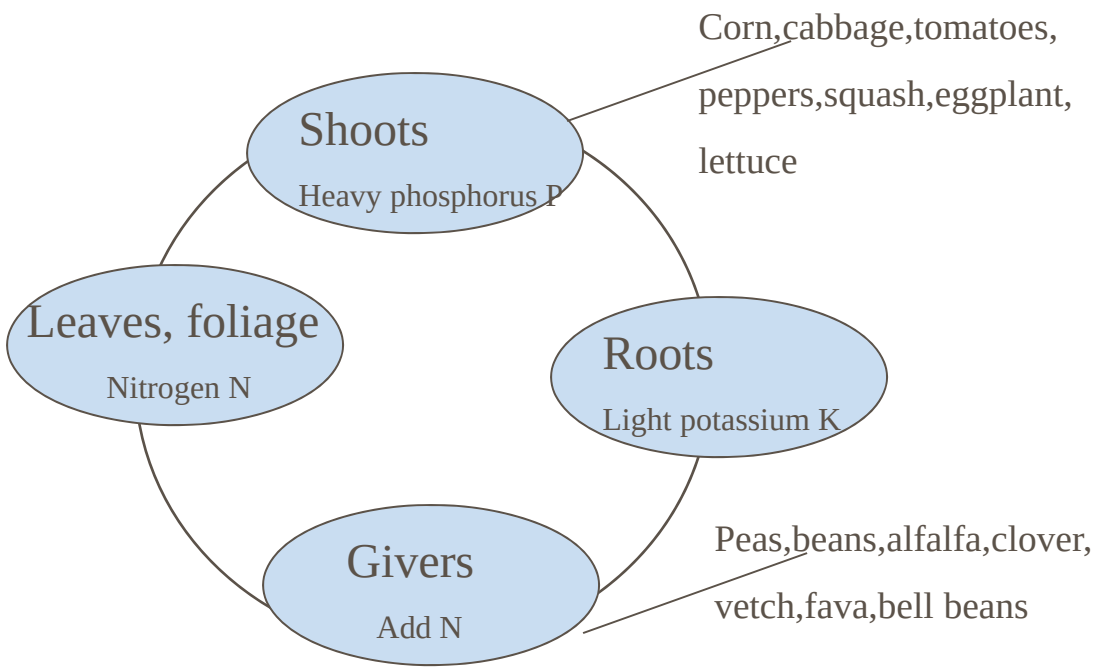
Cabbage-Mustard – cole crops, radish, turnip,greens

Lily family – onion, leek, garlic, shallots, chives

Squash family – squash, melons, cucumbers

Beet family – beets, spinach, chard

Carrot family – carrots, parsnips, parsley, dill, fennel, etc



Intercropping and companion planting

- Intercropping –

Planting a diversity of crops together

  - Deter pests
  - Complementary growth patterns
    - Shade tolerant under Sun lovers
    - Fast growers with slow
    - Deep and shallow rooted
    - Vining crops on trellis with small crop at base
    - Tall with shorter (“3 sisters” of Am. Indian lore)

Intercropping and companion planting

- Companion planting –

Planting certain crops together to achieve greater productivity

  - Not much evidence for chemical enhancement or inset repellant
  - Some plants are pollinators as well as attractive in the garden, worth interplanting – borage, chives, basil, nasturtium
  - “Anti-companions” (allelopaths) can be used as cover crop for weed suppression

Best planting times

- Seasonal – choose appropriate plant for the season
  - Warm Season Crops –
    - corn and beans throughout summer
    - Tomatoes, eggplant, peppers – start early
    - Cucumbers, melons, squash, pumpkins, okra
  - Cool Season –
    - Cole crops – cabbage, broccoli, etc Early spring, or better yet fall
    - Carrots, turnips, beets, root crops - early in spring
    - Greens (lettuce, chard, spinach, etc) radishes, potatoes – Early spring

Lunar cycle

- John Jeavons advice for best germination times (when lunar gravity is strongest)
  - New Moon – plant 2 days before new moon for most vegetables and herbs
  - Full Moon – transplant and seed long germinating seeds: most flowers

- Cool Season Crops

55-75 – Asparagus, rhubarb, chives, garlic, leeks, onion, shallots

60-65- Beets, broad beans, broccoli, cabbage,chard, collards,kale,kohlrabi, parsnip,radish,rutabaga, sorrel,spinach,turnip

Artichoke,carrots,cauliflower ,celery,chinese cabbage, fennel, lettuce, parsley, peas, potatoes

- Warm season crops

60-75 - Beans, corn, pumpkins, squash, cucumbers, melons, okra

70-80 - Peppers, tomatoes, eggplant, sweet potato, watermelon

Pests, Diseases and Controls

- ID the problem, monitor the damage

Insects

Cultural/Environmental

Herbicide injury

Disease

Most common insect damage

- Chewed or holey leaves

- Rolled leaves

- Webs, froth, bags

- Mined leaf

- Chewed vegetable
- Damaged oozing bark

Most common plant diseases

- Fungi
- Bacteria
- Viruses

How to recognize viral damage

- Yellowed, light green or mottled leaves
- Stunted growth
- Leaf or fruit distortion

“ Bad Bugs”

Common garden insects

- Cucumber beetles

- Darkling beetles

- Loopers

- Leaf miners

Common garden insects

- Aphids

- Hornworms

- Earwigs

- Cutworms

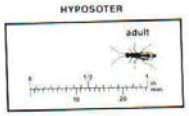
- Sowbugs

- Squash bugs

The parasitic wasp *Hyposoter* is laying an egg in a caterpillar.

The black and white pupa of the parasite *Hyposoter exigua* is shown here attached to the skin of the beet armyworm it consumed in its larval stage.

This yellowstriped armyworm has been pulled apart to reveal the larva of the parasitic wasp *Hyposoter* within.



Adult moths of many garden caterpillars look similar. Shown here are (a) variegated cutworm, (b) the beet armyworm, (c) the cabbage looper, (d) the tomato fruitworm, (e) the tobacco budworm and (f) the western yellowstriped armyworm.

“Good Bugs”

Beneficial insects - predators

- Soldier beetle

- Ladybird beetle

- Assassin bug

- Damsel bug

- Big eyed bug

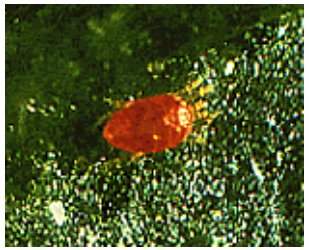
Beneficial predators

- Lacewings

- Predacious ground beetle

- Pirate bugs

- Predatory mites



- Spiders

Beneficials insects - parasites

- Trichogramma wasp

- Mini wasps – hyposoter
- Other wasps
- Other flies
- Syrphid fly(hover)

- Tachnid fly

Insectary plants for beneficials

- Apiaceae – carrot family, umbels, many herbs
- Asteraceae – daisy or composite family
- Brassicaceae – cabbage family, mustards
- Caryophyllaceae – carnation or pinks
- Dipsaceae – scabiosa “pincushion flower”
- Schrophulariaceae - Penstemon

Carrot family

(celery, parsley)

Asteraceae - calendula

Organic pesticides

Insecticides

- Bacillus thuringensis(BT)
- Diatomaceous earth
- Nicotine sulfate
- Pheromones
- Pyrethrum
- Rotenone
- Ryania
- Sabadilla
- Soaps
- Sulfur dust
- Vegetable oils

Fungicides

- Copper sulfate
- Fungicidal soap
- Lime sulfur
- Sulfur

Timing is everything~

Organic pesticides

- Bt- bacillus thuringensis, several formulations – Dipel, thuricide, others
  - Controls many species of caterpillars, mosquito larvae(they eat it
  - Registered for many crops
- Insecticidal soaps – “safer soaps”, others
  - Fatty acids + water+alcohol – diluted
  - Works as a contact spray, no residue
  - Effective against small, soft bodied insects

Organic Pesticides

- Horticultural oils(dormant oil) – Volck oil, Sunspray, Supreme oil
  - Hydrocarbon derivative
  - Control aphid, psylla, scale, mites, mite eggs
- Summer oils
  - Hydrocarbon derivative
  - More highly refined, may be used in summer – water first
- Copper spray – dormant(2-3 times) microcop, others
  - Fixed copper – must be 50% or more
  - Peach leaf curl, other

Weed Control Strategies

SOLARIZING SOIL TO KILL WEEDS AND DISEASES

raising the temperature enough to kill most weeds (unfortunately, Bermuda grass and red clover usually survive this process). Earthworms aren't harmed; they simply tunnel deeper into the soil.

Here's how to solarize soil.

- Pick an area that's at least 2 feet wide (it's hard to retain the heat in a bed narrower than this). Clean the bed of all weeds and rocks; if you plan to include an irrigation system, install it now. Thoroughly wet the soil to a depth of 8–12 inches.
- Buy enough 1–4-mil clear plastic to cover the bed twice. Place the first layer of plastic on the ground. Place the second layer over the first, raising it a few inches by placing bricks or cans between the layers. Leave enough plastic around the edges so you can bury it a couple of inches in the soil.
- Wait four to eight weeks before removing the plastic—and now you're ready to plant.

You probably can't dig up everything in your garden and solarize all the soil. Other areas still require traditional methods such as hoeing and digging out young weeds before they become established. It's especially critical to remove them before they flower and disperse more seeds into your garden.

Mulching areas between plants makes it harder for many weeds to grow after germination. Those few that do work their way through the mulch can usually be pulled out more easily than those that grow in unmulched areas. To help keep weeds from growing through a mulch, first lay down sheets of landscape fabric—its meshlike quality lets the soil breath and water penetrate, but few weeds can grow through it.

In some areas it seems that nothing other than an herbicide will dislodge weeds. Some grow between concrete paving and brick paths or come up throughout a gravel driveway. In other situations, a garden or orchard may simply be too large for hand-weeding. In cases such as these, two methods using heat can help you eradicate weeds without using an herbicide.

When heated to a high enough temperature, weeds rapidly dehydrate and die because the water in the cells boils, rupturing the cell membranes and escaping. You can make this happen by pouring boiling water on the weeds—a method you may find effective in getting rid of weeds in walks and pathways that are close to your house. Simply boil water in a teakettle and slowly pour it over each weed for a few seconds.

A more efficient method, and one that can be used over a wide area, is to use a flamer, available from farm and garden suppliers. This tool is a handheld rod with a propane-generated flame at the end; it is similar to devices sold to defrost frozen water pipes. You don't actually burn the weed but heat it. Two seconds of flame are enough to boil the liquid inside the weed.

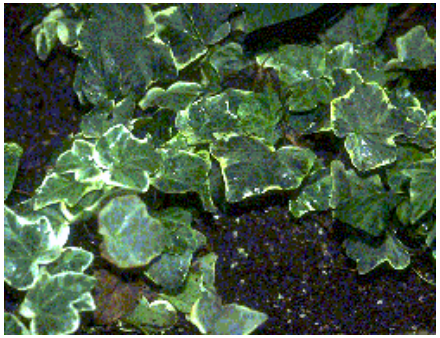
Hot Ideas for Killing Weeds

Boiling-hot water from a tea kettle kills weeds growing through cracks and pavers (left). A propane-powered flamer doesn't burn weeds; it heats them until their cells burst (right). Take care in using a flamer in dry, fire-prone areas.

Weeds

- Periwinkle – Vinca

- Algerian Ivy



- English ivy

- Fountain Grass

Weeds

- Scotch Broom

- French Broom

- Pampas grass

- Giant Reed

Weeds

- Scarlet wisteria

- Chinese tallow tree

- Water hyacinth

Weeds – not to be shared!

- Tamarisk

- Tree of heaven

- Himalayan blackberry

- Oblong spurge

- Perennial pepperweed

Master Gardener "Most Annoying"

- Field bindweed

- Chickweed

- Curly dock

- Sheep sorrel
- Klamath weed

- Knotweed

Master Gardener “Most annoying”

- Oxalis

- Sour grass
- Pigweed

- Plantain

- Prunella, selfheal

- Purslane

- Sow thistle

“Most Annoying”

- Lambs quarters

- Cheeseweed

- Milk thistle

- Canada thistle
- Mullein

- Nut sedge

More “Most Annoying”

- Spotted spurge

- Tarweed

- Vinca
- Sow thistle

- Wild carrot, Queen Anne’s lace

“ The best Fertilizer in the garden is the Gardener’s Shadow”

- old New England proverb