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VEGETABLE GARDEN PLANTING GUIDE FOR SAN DIEGO COUNTY

Vincent Lazaneo, Farm Advisor Emeritus
UC Cooperative Extension

This planting guide covers the coastal and inland regions of San Diego County. Planting periods for some common cool and warm season vegetables are given for a year having average weather conditions. The beginning and end of a planting period can vary by several weeks from year to year. Gardeners need to exercise more judgment when planting early or late in the season. Suitable planting dates are dictated to a large extent by the amount of time a vegetable takes to grow from seed to a harvestable size and by the vegetable's climatic requirements. Seed packets and catalogs give the number of days required from seed to harvest under optimum growing conditions. The cold tolerance of some vegetables is listed below as a guide for early planting.

Hardy Vegetables: This group includes: cabbage plants (which have been well hardened), kale, kohlrabi, brussel sprouts, spinach, turnip, radish, asparagus, rhubarb and onion (from sets). These vegetables are not injured by light frosts and the seed will germinate at a rather low temperature.

Half-Hardy Vegetables: This group includes: lettuce, beet, carrot, chard, parsley, parsnip, heading broccoli, early potatoes, onion (from seed), garden peas, celery plants, and cauliflower plants. The seeds of these vegetables will germinate at rather low temperatures, but the young plants are injured by frost.

Tender Vegetables: This group includes: snap bean, tomato, sweet corn, and sweet potato. These vegetables are injured by the lightest frost and do not thrive at a low temperature even when frost does not occur. They should not be planted until all danger of frost is past.

Very Tender Vegetables: This group includes: eggplant, pepper, cucumber, watermelon, muskmelon, lima bean, squash, and pumpkin. These vegetables do not thrive until the soil has become warm. The seed will rot if the soil is not warm.

To prepare a garden for planting, rototill or spade the soil to a depth of 8 to 12 inches, then break up clods and rake the surface level. Work soil when it is moist but not wet.

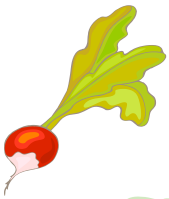
Organic compost, manures and other amendments should be mixed into the soil at this time. A pre-plant (starter) fertilizer should also be mixed into the soil prior to planting. Commercial fertilizers can be used alone or in combination with manures and compost to provide adequate soil fertility. If animal manures is used spread it evenly over the soil and thoroughly mix it into the top 6 inches of soil, 4-6 weeks before planting to avoid plant injury. For 100 square feet of area apply 20 pounds of composted poultry manure or 60 pounds of steer/dairy manure. Before planting, periodically water to leach harmful salts out of the surface soil. Mix commercial fertilizer containing nitrogen, phosphorus and potassium into the top six inches of soil just before planting at the rate recommended on the product label.

If a soluble chemical fertilizer was applied prior to planting, additional applications of a fertilizer containing only nitrogen are usually made periodically during the growing season to sustain vigorous plant growth. Apply nitrogen when seedlings are 3-4 inches tall, or about a month after setting out transplants. For 100 feet of row, evenly scatter 1 pound of ammonium sulfate (21% N) a few inches from the plants on each side of the row. Then water well with a sprinkler to dissolve and carry the fertilizer into the soil.

Most vegetables fall into two groups:

COOL SEASON CROPS

Food value is generally higher per pound than in warm season crops



We eat a vegetative part of the plant:

- Root – carrot, parsnip, beet, radish, turnip
- Stem – Kohlrabi, white potato
- Leaf – spinach, lettuce, celery, asparagus, cabbage, onion
- Immature flower parts – cauliflower, sprouting broccoli, globe artichoke

Planting time should allow the crop to mature during the cool season
Root depth is shallow to medium

Storage is at a cooler temperature and for a longer period than for warm season crops
Store at 32°-42° F, except white potatoes (50°- 60° F)

WARM SEASON CROPS

Food value is generally lower per pound than in cool season crops

We eat the fruit of the plant:

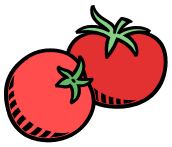
- Mature fruit – tomato, watermelon, cantaloupe, winter squash
- Immature fruit – summer squash, cucumber, snap and lima beans, sweet corn

Planting and harvesting time should be in the warm season.

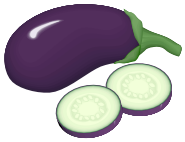
Root depth is medium to deep

Storage is at a warmer temperature and shorter period than for cool season crops
Store tomatoes, garlic, onions and unripe melons at room temperature away from direct sunlight
Store peppers, cucumbers, ripe melons, snap beans, summer squash at 45°-55°

Note: Two exceptions to the above classifications are peas (a fruit, yet a cool season crop) and sweet potatoes (a root and warm season crop)



RECOMMENDED PLANTING DATES



Coastal Region (1&2)
Warm Season

Beans, Snap	Mid Mar - Aug
Beans, Lima	Mid Apr - Jul
Cantaloupe	Apr – Jun
Corn, Sweet	Mid Mar – Jul
Cucumbers	Mid Mar – Jul
Eggplant (plants)	Apr – Jun
Melons (Casaba, etc)	Apr – Jun
Okra	Apr - Jun
Pepper (plants)	Apr - Jul
Squash, summer	Mid Mar - Aug
Squash, winter	Apr – Jun
Sweet Potato (plants)	Apr – Jun
Tomato (plants)	Mar – Jul
Watermelons	Apr – Jun

Cool Season

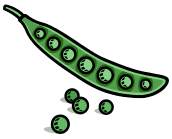
Beets	Sept - May
Broccoli (plants)	Sept - Feb
Broccoli (seeds)	Aug - Dec
Cabbage (plants)	Sept - Feb
Cabbage (seeds)	Aug - Dec
Carrots	Sept - Apr
Cauliflower (plants)	Sept - Feb
Cauliflower (seeds)	Aug - Dec
Chard	Sept - Jun
Endive	Sept - May
Kale	Sept - Apr
Kohlrabi	Sept - Mar
Head Lettuce	Sept - Mar
Leaf Lettuce	Sept - Apr
Onion (bulb)	
Short Day	Oct - Dec
Medium Day	Jan - Feb
Onion (green)	Sept – May
Peas	Sept - Mar
Potatoes (Irish)	Feb – Mar
	Mid Aug – Sept
Radish	Sept - May
Spinach	Sept - Apr
Turnips	Sept - May

Inland Region (3&4)
Warm Season

Beans, Snap	Apr – Mid Aug
Beans, Lima	Mid Apr - Jul
Cantaloupe	Apr – Jun
Corn, Sweet	Apr – Jul
Cucumbers	Apr – Jul
Eggplant (plants)	Apr – Jun
Melons (Casaba, etc)	Apr – Jun
Okra	Apr – Jun
Pepper (plants)	Apr - Jun
Squash, summer	Apr – Jul
Squash, winter	Apr – Jun
Sweet Potato (plants)	May – Jun
Tomato (plants)	Apr – Jun
Watermelons	Apr – Jun

Cool Season

Beets	Sept – Mid Apr
Broccoli (plants)	Sept – Feb
Broccoli (seeds)	Aug – Oct
Cabbage (plants)	Sept – Feb
Cabbage (seeds)	Aug – Oct
Carrots	Sept - Mar
Cauliflower (plants)	Sept – Feb
Cauliflower (seeds)	Aug – Oct
Chard	Sept – Apr
Endive	Sept – Apr
Kale	Sept – Apr
Kohlrabi	Sept – Mar
Head Lettuce	Sept – Feb
Leaf Lettuce	Sept – Mar
Onion (bulb)	
Short Day	Mid Oct – Dec
Medium Day	Jan – Feb
Onions (green)	Sept - Apr
Peas	Jan - Mar
Potatoes (Irish)	Mid Feb - Apr
	Mid Aug – Sept
Radish	Sept – Mar
Spinach	Sept – Mar
Turnips	Mid Sept – Apr



SAN DIEGO COUNTY COASTAL AND INLAND

BIOCLIMATE REGION

Coastal Region Subdivisions

1 – Maritime Zone

Inland Zones

2 – Hill & Mesa District

3 - Valley & Canyon District

4 – High Elevation Zone

Approximate Area = Sea Level to 2000’ Elevation Contour

Bioclimates are complexities of weather that differ from each other in some characteristic of importance to plants and animals.

Subdivisions of California’s bioclimates are named for the geographic areas with which they are most closely associated. These names are used to designate the agricultural areas of the state.

BED TYPE	ADVANTAGES	DISADVANTAGES
RAISED Enclosed container constructed with wood, concrete, or rock. The height may vary. Soil level usually 8'' to 10'' up to 24'' to 36''.	• To overcome poor soil conditions • Lack of ground space • Aesthetically pleasing • Less bending for maintenance	• Cost • Using rot-proof lumber • Finding correct soil mixture to fill bed • Soil dries faster • Difficult to turn soil without compacting if beds are too wide
SUNKEN Excavate soil one foot deep. Pile soil to sides for walk ways. Break up bed, bottom, and amend.	• For arid or windy regions-traditionally used by desert Indians • Excavated soil in waffle pattern-water soaks in basins • High sides protect seedlings from wind	• Must have good drainage through bed bottom • Not good for high rain fall area
MOUND This type has no retaining walls. Soil is double dug and amended with compost. Soil volume increases and mounded on bed top. Water slowly and deep with drip tape.	• Low cost • Excellent for compacted or heavy soils • Easy to replace soil amendments and turn soils • Easy harvesting	• Maintenance is to keep sides from eroding • Need drip system to irrigate properly • Need a gutter dug along sides to direct excess water into bed bottom

JOYCE GEMMELL, Instructor

Vegetable Gardening

Starting the Garden with Row Covers

What are floating row covers?

Sheet plastics are well known to home gardeners who have used them for a number of years in various ways. We now have a new product, a feather-weight blanket, known in the trade as a floating row cover for vegetable crops.

There are various manufacturers and types made from polyethylene, polypropylene and spun-bonded polyester (**Reemay**).

The testing I have done for the past ten years has been with **Reemay** and others. **Reemay** is the trademark for a spun-bonded polyester by **DuPont**. This product was introduced to commercial vegetable growers in 1983-84 after the University of New Hampshire testing reports showed promising results with its use. Although it was primarily thought of as protection against frost, it only provides about 3 degrees. It was recommended as a growth intensifier which speeded up maturity and increased yield. Advantages and disadvantages which I have observed are listed below.

Advantages

1. Insect control/aphid, leaf hoppers, flea beetle
2. Transplant survival, transpiration reduced
3. Increase of soil temperatures in spring
4. Wind protection/reduced evaporation on soil surface
5. Frost protection/extends harvest
6. Increased yield/earlier set

Disadvantages

1. Cost
2. Increased labor
3. Insect buildup/lack of predators
4. Heat buildup
5. Friction
6. Live of material and storage

Installation varies with crop and season

1. Direct seed, place material on soil surface.
2. Transplants, use wire hoops or place directly over plants with ample slack to allow for growth of crop underneath.
3. Weed control with herbicides or plastic mulch with transplants. Tight planting shades soil surface with very little weed growth.

Changes in Management for Crop and Season

FALL
- High daytime temps./watch soil moisture
- High light intensity/inland
- Bird and mammal crop protection
- Insect protection on brassicas

SPRING
- Day and night temperature fluctuation
- Wind, hail land frost
- Insect/aphid protection

Irrigation
- Drip tape or tube
- Hand watering/water penetrates material and dries quickly

How Long Do You Leave Cover On?
1. Small leaf crops - 3-4 months
2. Root crops - 1-2 months
3. Tomatoes, peppers, eggplant/ 4 weeks or when plants touch cover
4. Cucurbits - 4 weeks or hen plants bloom
5. Beans and corn - 4 weeks if needed for insect control
6. Brassicas - after transplanting 4-6 weeks.

A word of caution for all of the above if you live inland: During hot spells 80° and above, there is a tendency to ventilate the plants by lifting the covers. Loss of insect protection will occur and is not necessary as long as the soil moisture is checked daily. **Reemay** provides about 20% shade and is sufficiently porous to allow for self-ventilation. If a polyethylene material is used, day temps are higher inside tunnels --watch!

It is also recommended that you check under the covers for insect damage or population build-up on a regular basis. Hand picking or soap spraying is effective if caught early.

Resource

Gardener's Supply Co., 128 Intervale Road, Burlington, VT 05401-2850
Small pieces available, catalogue free.

Peaceful Valley Farm

Joyce Gremmell, Master Gardener Association of San Diego County

Six Spring Vegetables and How to Grow Them

Tomatoes

Varieties

- Plant Sizes
  - Semi-Determinite
  - Determinite
  - Indeterminite
  - Dwarf
- Heirlooms and Hybrids
- Use:
  - Paste
  - Cherry
  - Slicers

Culture

- Microclimates: Coastal vs Inland planting dates
- Maturity dates for your climate for season-long harvest
- Fertilizing and soil management
  - Side dressing
  - Over-fertilization

Disease and Pest Control

- Insects
- Bacterial
- Virus
- Fungal
- Rotate to isolate
- Use of disease-resistant varieties

Peppers

Varieties

- Plant type
  - Sweet
  - Mild
  - Hot
- Heirlooms and Hybrids: European and United States
- Use:
  - Frying
  - Pickling
  - Stuffing

Culture

- Microclimates: Coastal vs Inland planting dates
- Maturity dates for your climate for season-long harvest
- Transplants and soil temperature
- Fertilizing and soil management
  - Side dressing
  - Over fertilization

Disease and Pest Control

- Insects
- Bacterial
- Virus
- Fungal
- Rotate to isolate
- Use of disease-resistant varieties

March 17, 2014

Joyce Gremmell, Master Gardener Association of San Diego County

Six Spring Vegetables and How to Grow Them

Cucumbers

Varieties

- Plant type
  - Bush
  - Vine
- Use:
  - Pickling
  - Slicing

Culture

- Warm season vegetables
- Row covers at juvenile stage
- Fertilizing and soil management
- Irrigation, light feeding
- Pollination problems

Disease and Pest Control

- Fungal – Powdery Mildew
- Virus
- Insects
- Bacterial – Wilts
- Use of disease-resistant varieties

Squash

Varieties

- Plant type
  - Summer
    Harvest at
    juvenile stage
  - Winter
    Harvest at hard shell

Culture

- Warm season vegetables
- Row covers at juvenile stage
- Transplants and soil temperature
- Fertilizing and soil management

Disease and Pest Control

- Fungal – Powdery Mildew
- Virus – Mosaic Virus
- Insects
- Bacterial – Wilts
- Use of disease-resistant varieties

March 17, 2014

Joyce Gremmell, Master Gardener Association of San Diego County

Six Spring Vegetables and How to Grow Them

Beans

Varieties

- Plant type
  - Bush
  - Pole
- Varieties
  - Stringless
  - Flat pods
  - Colored pods
  - Long pods
  - Soy bean / edammae
- Use
  - Snap or green bean
  - Shelling (seed mature but green: crowders)
  - Dry bean (for storage)

Culture

- Coastal microclimates may need row cover
-
-

Disease and Pest Control

- Bacterial – Blights
- Fungal – Blights, Powdery mildew
- Virus
- Insects – Leaf miners, aphids, leaf hoppers

Joyce Gremmell, Master Gardener Association of San Diego County

Six Spring Vegetables and How to Grow Them

Corn

Varieties

- Varieties
  - Sweet
  - Super sweet
  - Popcorn
  - Ornamental
  - Grain corn

Culture

- Full sun
- Warm temperatures
- Polination: growing in blocks rather than single row
- Heavy feeders – fertilize before and at knee-high
- Regular water

Disease and Pest Control

- Insects – corn ear worm, aphids, grasshoppers
- Fungal – corn smut
- Bacterial
- Virus – rust

Joyce's Chart for Variety Comparisons

*	Variety Name & Supplier	Date Seeded	Date Transplanted	Date in Field	Soil Temp at 6 inches	Maturity Date	Harvest Date	Remarks
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* Key for Plant Type: L=Lettuce, B=Brassica, O=Misc. Other, G=Misc. Greens, R=Root Crops

French Intensive Gardening: A Backyard Translation

By Charles Anderson

The rebirth of biodynamic-French intensive vegetable gardening in the United States over the past decade could launch an era of abundant food, using less land and water and few or no pesticides. Moreover, it might restore a balance of nature to modern farming.

But that's not happening.

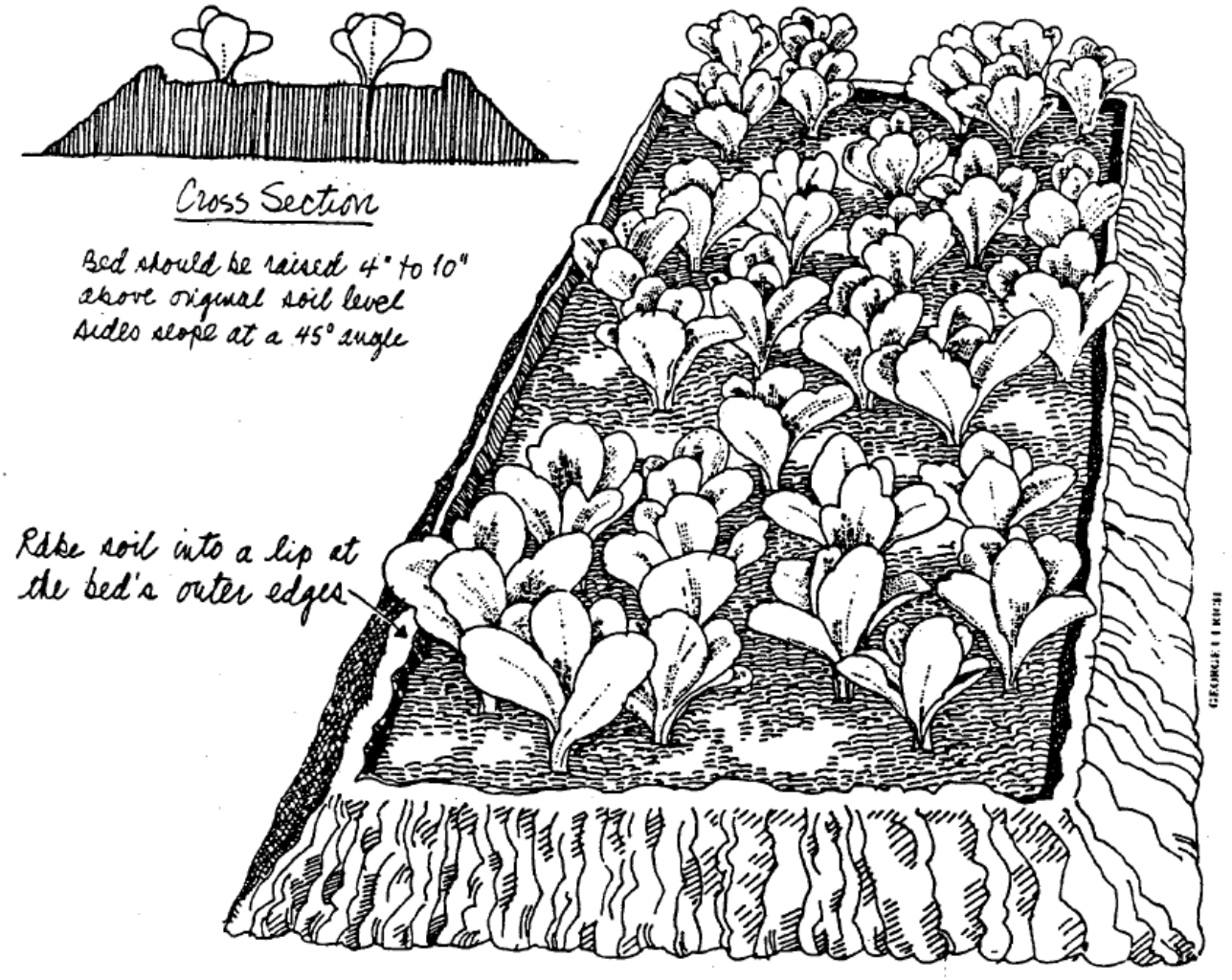
This promising approach to the production of food remains controversial and misunderstood except within the cult of followers who have adopted it as the farming method of the future.

There are many reasons for its lack of acceptance. Some of them are rooted in the unwillingness of many people to change a long-standing way of things. Other reasons are traceable to industries, which have a lot to gain from traditional farming methods, and to the modern belief that a retreat from technology cannot be progress.

But there is no good reason why individual backyard vegetable gardeners can't provide a proper example for agribusiness. If a few hundred thousand from among the millions of vegetable gardeners embraced the biodynamic-French intensive method, it would be a reasonably convincing test of its worth.

There are purely selfish motives, too, the biodynamic-French intensive method-I call it bi-fi-is reputed to produce a much bigger harvest with less physical labor over the long run. More turnips and less weeds! Also, the water consumption won't be quite so high.

The single catch to this seeming panacea is that a bi-fi garden must start with



a thorough program of soil preparation called “double digging”. Yes, it involves double the amount of normal garden digging; however, this hard work occurs only once.

Double digging, which is illustrated in the accompanying box (p. 59), involves loosening the soil to twice a spade’s depth and incorporating lots of organic matter into the soil. The end result is a series of wide, raised beds.

Alan Chadwick, an Englishman, first combined the French intensive techniques started in the 1890s outside Paris with biodynamic techniques pioneered in Austria in the early 1920s.

French intensive gardens grow crops with the plants touching. This self-shading minimizes weeds and conserves soil moisture. In biodynamics, organic soil conditioning and “companion planting” are important factors in a method that tries to copy nature’s way of growing plants. Chadwick introduced his biodynamic-French intensive method to the United States in 1966, producing a lush, four-acre organic garden on a barren, clayey hillside at the University of California campus in Santa Cruz.

Now that the word slowly has spread, bi-fi gardens grow in scattered backyards and at a few institutions, where they can be studied in large scale and for long periods. One is the experimental garden of Ecology Action of the Midpeninsula in Palo Alto, California, where John Jeavons, a blond-bearded young man and a corps of gardeners are documenting yields under strict conditions.

“Our initial research,” reports Jeavons, author of *How to Grow More Vegetables*, “seems to indicate that the method produces an average of four times more vegetable per acre than the amount grown with mechanized and chemical agricultural techniques. The French intensive method also appears to use one-half the water and 1 percent of the energy consumed by commercial agricultural per pound of vegetable grown”.

To get this kind of result, double digging is the first step. It should result in a bed raised 4 to 10 inches above native soil level because of the compost being added and air pockets introduced by working the soil.

Composition of the compost is important to bi-fi gardeners. The simple recipe consist of one-third vegetation, one-third kitchen scraps and one-third soil. This compost-making method differs from some others in that it forbids fertilizers, manure or supplemental nitrogen. The nitrogen content in the green materials, plus frequent turning and chopping of the ingredients into small pieces combine to yield completed compost in two or three months.

Once the soil is prepared (you will be relieved to know this takes much less work the second and succedding times), beds 3 to 5 feet wide should be formed gently with sides slanting at 45 degree angles. The soil should not be compacted at all, while preparing the beds during the growing season or season harvests. The air content and texture of the soil are all important in bi-fi culture. The texture, as in non-bi-fi gardening permits good root growth and water penetration.

Biodynamic-French intensive gardeners follow numerous complicated companion planting rules, which they believe help achieve best growth and yield, while keeping down bugs and disease without use of poisons.

“To get good tasting bibb lettuce plants,” Jeavons advises in his book. Also, he notes, green beans and strawberries like each other. But beans and peas are inhibited by onions.

The accomplished practitioner learns what goes with what by studying the charts and lists which abound in bi-fi literature.

When planting a seed in a bi-fi garden, you should plant it only as deep as the seed is long and cover it with finely sifted compost. Seeds are planted in a hexagonal pattern close enough together so the plants, when mature, will barely touch. The "within the row" spacing listed on the seed packet usually are fine, but sometimes the distance needs to be reduced by about one-fourth. You find out by experience.

If you sow your seeds in a flat instead of in the ground, there is a strict progression of increasingly compost-laden soils through which the seedlings must move. Chadwick has dubbed this the "breakfast –lunch-dinner" technique.

The idea is to minimize transplant shock when potting seedlings by giving them more coarsely textured soil at each step. The roots are supposed to like the new soil better and not rebel.

When it comes to watering, all normal rules of gardening are broken. With bi-fi, one waters lightly each day instead of deeply less frequently. The well-prepared soil retains enough moisture to satisfy the plants. However, the bi-fi gardener is cautioned to pay close attention to the plants, whose appearance will express their need for more or less water.

With plants that don't mind water on their leaves, water is applied lightly in a rain-like spray. Otherwise, it is applied gently to the soil with a watering wand on a hose. Watering is done two hours before sunset. The warm soil makes the water tepid before it reaches the roots, but the water isn't exposed to the sun long enough to be lost through evaporation.

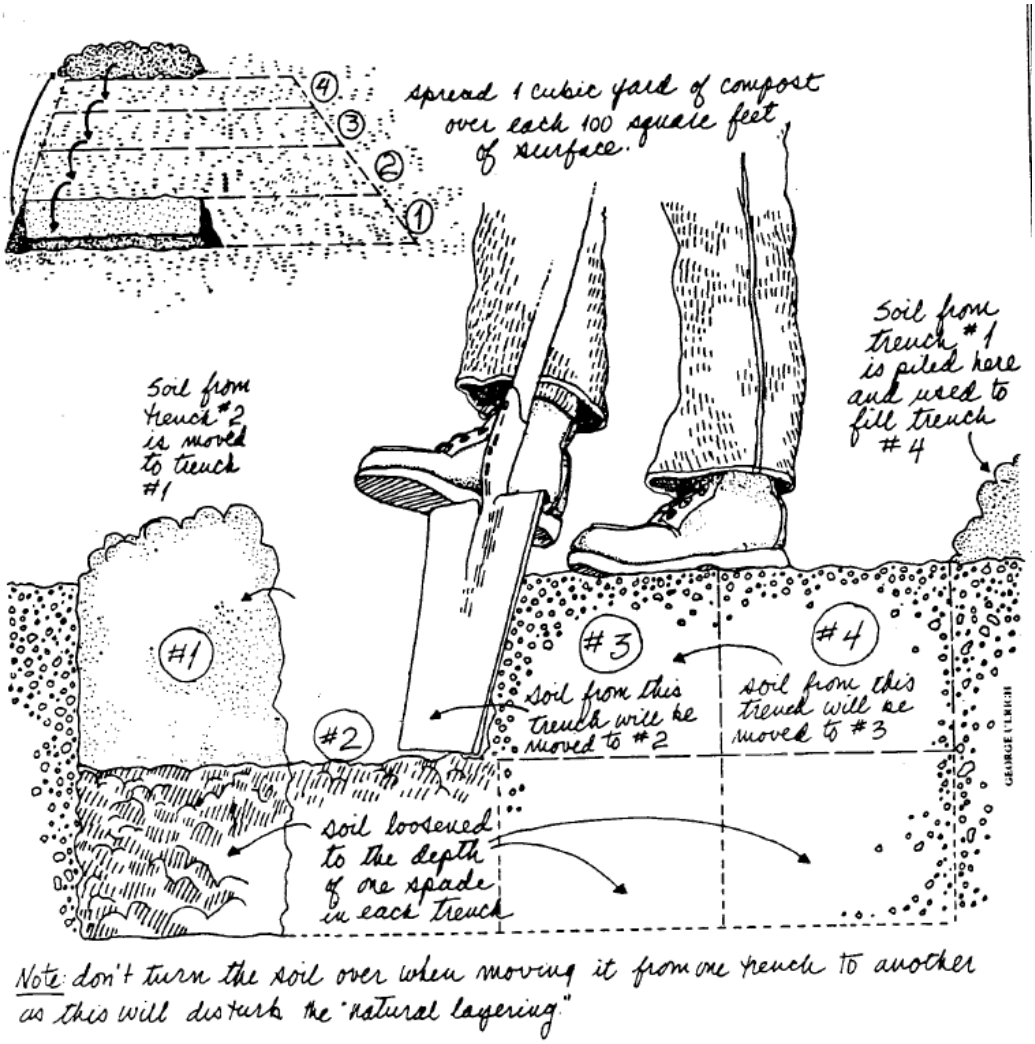
The best grown plants are reputed to resist insect and disease attacks, but the bi-fi method includes emergency controls that are limited to non-poisonous techniques varying from handpicking to use of birds, toads, and other predators as well as herb-derived sprays.

"The biodynamic-French intensive method of horticulture is a quiet, vitally alive art of organic gardening which relinks man with the whole universe around him," according to Jeavons.

"Man finds his place by relating and cooperating in harmony with the sun, air, rain, soil, moon, insects, plants, and animals rather than by attempting to dominate them…We each become gentle shepherds proving the conditions for plant growth."

It sounds good enough for me to try even if it doesn't generate any food. But it really does work. If you were not aware of it, or have tried it, I commend it to your attention. It deserves more widespread study.

Charles Anderson writes on gardening for the Oakland Tribune*. He recommends as an excellent introduction to bi-fi gardening John Jeavons'* How to Grow More Vegetables Than You Ever Thought Possible on Less Land Than You Can Imagine*, available for $4 from Ecology Action, 2225 El Camino Real, Palo Alto, CA 94306.*



Double digging a French intensive garden

Double digging, the first step in preparing a biodynamic-French intensive garden requires three things in addition to cleared land: a flat spade, a supply of compost and a strong back.

First of all, spread one cubic yard of compost over each 100 square feet. To double dig, divide your space into rows as wide as your spade. Begin with Row No. 1, sinking the blade fully into the soil, lifting a shovel and carrying it over just beyond the last row in the bed (in our sample, it is Row No. 4).

Do the same thing all down Row No. 1 until you end up with a trench and long mound of soil on the other side of the garden.

Now, standing in the same row, dig the spade into the subsoil as far as it will go. Your goal is to sink it all the way, but don't life it this time-all you need to do is push down and lever the soil up so it is loosened. Move down the trench, doing this all along it.

Step over to Row No. 2 and begin all over. Shovel the first spadeful of soil over to Row No.1 without turning it over. The natural layering of the soil is organically important. Also, the way the compost incorporates itself into the soil is "natures' way" and does not need to be helped along by more mixing.

Move down the row, making a new trench and filling the first one. Then, move down Row No. 2 again, loosening the subsoil.

Repeat the process for each spade-wide row. When you get to the last row (our Row No. 4), finish up by filling the final trench with the soil that you removed from the first row. **Charles Anderson**

FERTILIZING VEGETABLE GARDENS

Hunter Johnson Jr., Extension Vegetable Specialist
University of California, Riverside.

To grow good vegetables the soil must contain adequate amounts of plant nutrients. Poor growth and yield may occur if fertilizers are not added to supply the plant nutrients, which are not present in the soil. It is important to apply fertilizers correctly and in reasonable amounts. Too much fertilizer or incorrect application can damage plants.

Plant nutrients include the following elements:

- **Major nutrients** are those which plants use in large amounts—nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur.
- **Minor nutrients** are used by plants in relatively small amounts—iron, zinc, copper, boron, manganese, molybdenum, and chlorine.

Plants also require oxygen and hydrogen, but these are supplied by the water and air. Garden soils in the most areas of California are adequately supplied with all plant nutrients except for nitrogen and phosphorus. Most vegetable crops will grow better and provide higher yields if nitrogen fertilizer is applied. The need for phosphorus varies from soil to soil, but crops grown during the winter months will benefit from an application of phosphorus fertilizer. Potassium is rarely required in most California soils even though it is included in many fertilizers. All of the other nutrients usually occur in adequate amounts in the soil, in the irrigation water or as impurities in the fertilizer materials.

The major plant nutrients, which are supplied by some common fertilizer materials, are shown in the following tables:

	Average Percentage[2]		
Organic Material	**Nitrogen (N)**	**Phosphorus (P_2O_5)**	**Potassium (K_2O)**
Poultry manure/droppings	3.6-5.0	1.3-3.2	0.9-1.9
Steer manure	2.0	0.5	1.9
Dairy manure	0.7	0.3	0.7
Goat manure	2.8	1.8	2.9
Rabbit manure	2.0	1.3	1.2
Horse manure	0.7	0.3	0.5
Hog manure	1.0	0.8	0.9
Dried blood	13.0	1.5	-
Fish meal	10.4	5.9	-
Fish emulsion	5.0	2.0	2.0
Bone meal	2.8	15.0	-
Alfalfa hay	2.5	0.5	2.1
Grain straw	0.6	0.2	1.1
Cotton gin trash	0.7	0.2	1.2
Compost[3]	0.1-1.0	0.1-1.0	0.1-1.0

The percentage of plant nutrients inorganic materials varies widely depending upon how much the material is processed, how the animals were fed, and the moisture content.

[2]Source: Western Fertilizer Handbook, 6th Ed., 1980.

[3]Source: Compost is an excellent source of organic matter, but has little value as a fertilizer material.

	Percentage		
Inorganic Materials	**Nitrogen (N)**	**Phosphorus (P_2O_5)**	**Potassium (K_2O)**
Ammonium nitrate	33.5	0	0
Ammonium sulfate	21.0	0	0
Calcium nitrate	15.5	0	0
Urea	45.0	0	0
Single superphosphate	0	20.0	0
Triple superphosphate	0	45.0	0
Mono ammonium sulfate	11.0	48.0	0
Ammonium phosphate sulfate	16.0	20.0	0
Di-ammonium phosphate	21.0	53.0	0
Potassium chloride	0	0	62.0
Potassium sulfate	0	0	53.0
Potassium nitrate	13.0	0	44.0
Mixed Fertilizers[1]			
20-10-5	20.0	10.0	5.0
6-12-6	6.0	12.0	6.0
12-12-12	12.0	12.0	12.0
4-10-10	4.0	10.0	10.0

[1]: Mixed Fertilizers are available in many ratios of nitrogen-phosphorus-potassium. The plant nutrients are generally derived from inorganic materials.

Prior to planting, it is a good idea to apply some fertilizer and mix it well with your soil. At this time, apply all of the phosphorus and part of the nitrogen that your crop will require. Phosphorus can be supplied from various fertilizer materials shown in the table, although some—such as superphosphate, bone meal, or ammonium phosphate—are better suppliers than others. Ammonium phosphate and fish meal are high in both nitrogen and phosphorus. Animal manures are the best choices but may not be readily available in all areas. Nitrogen and ammonium nitrate (nitrogen) and superphosphate (phosphorus), or urea (nitrogen), and bone meal (phosphorus) or dried blood (nitrogen) and bone meal (phosphorus). Mixed fertilizers such as 20-10-5 or ammonium phosphates (16-20-0 or 11-48-0) are excellent sources of nitrogen and phosphorus to use before planting.

If animal manures are used, apply several weeks before planting, mix thoroughly in the top few inches of soil, and irrigate to allow it to begin to decompose. Manures can cause severe injury or even kill seedlings if applied too heavily or too close to planting time. In addition to their nutrient value, animal manures have beneficial effect on the soil structure or consistency if reasonable amounts are applied annually.

Inorganic fertilizer is generally higher in nutrient content than organic fertilizer, and the percentages of nutrients are predictable. The nutrients in organic fertilizer will vary depending upon its source and how it is handled in processing. Inorganic fertilizer is therefore a more dependable source of nutrients.

Some suggestions for fertilizer applications to garden soil **before planting** are shown in the following table. Other nutrients can be used which supply approximately the same amounts of nitrogen and phosphorus. There are many types of fertilizers available.

Amounts per 1,000 Square Feet

		Approximate Volume (dry processed)	
Organic Materials	**Pounds**	**Cubic Feet**	**Gallons**
Poultry, goat, sheep, or rabbit manure	100-125	2 ½ -3	18-20
Steer, dairy, hog or horse manure	300-400	7 ½ - 10	60-75
Blood meal	20-25	½	3
Bone meal	20-30	⅓ – ½	2 ½ - 3
Fish meal	20-30		
Inorganic Materials	**Pounds**	**Pints**	
Ammonium nitrate	4-5	5-6	
Ammonium sulfate	7-8	7-8	
Urea	3-4	4-5	
Single superphosphate	10-12	8-10	
Potassium sulfate (16-20-0)	9-10	9-10	
12-12-12	12-15	11-14	
16-16-16	9-10	8-9	
19-9-0	7-8	7-8	

During crop growth most crops will need more nitrogen fertilizer. The nitrogen fertilizer should be applied in one or more “side dressings” as shown in the attached diagrams. The first side dressing should be applied on direct-seeded crops at the time when the plants have four to six true leaves. For transplants the first side dressing should be applied about four or five weeks after planting. Additional side dressings should be applied at intervals of about four to six weeks depending upon the crop. Leaf type crops, such as lettuce, cabbage or spinach, should have a second side dressing when the crop is about half grown. Fruiting crops, such as tomatoes, peppers, melons or squash, should have a second side dressing about the time when the first fruits are set. In sandy soils, which require frequent

irrigation, more side dressings of small amounts of fertilizer will be required at more frequent intervals. Animal manures are not as successful for side dressings, but can be used if tilled into the soil.

Where furrow irrigation is used, the fertilizer should be banned into each side of the bed, four to six inches from the plants, and an inch or two deep. If it is too close to the plants or the rate too high, the plants could suffer temporary salt burn. Fertilizer can also be scattered along the sides of the beds and watered in, but this method is less effective than banding it into the bedside.

Where sprinkler irrigation is used, the commercial fertilizer can be sprinkled on the surface three or four inches from the plants and irrigated in. Care should be used to keep the fertilizer off the plant leaves. Where drip or trickle irrigation is used, the fertilizer may be scattered on the soil surface adjacent to the tubing.

The table below provides suggested rates for side dressings with various kinds of nitrogen supplying fertilizers. If the fertilizer you are using is not shown in the table, select the rate for a fertilizer, which has the same or similar percentage of nitrogen. For instance, if you wish to use a 20-10-5 fertilizer on a 36-inch row spacing, you can apply 5 cups per 100 feet of row (based on 19-9-0 rate). If your 36-inch rows are only 20 feet long, apply 1 cup of 20-10-5 (of the rate per 100 feet). You can also obtain rates for single plants by dividing the amounts in the 12-inch column by 25 (there are 16 level tablespoons or 48 level teaspoons per cup).

Amounts per 100 Feet of Row

	Spacing Between Rows					
Fertilizer	**12 inches**		**24 inches**		**36 inches**	
	lbs	**cups[1]**	**lbs**	**cups[1]**	**lbs**	**cups[1]**
Calcium nitrate (15.5-0-0)	1.0	1.8	2.0	3.6	3.0	5.4
Ammonium sulfate (21-0-0)	0.75	1.35	1.5	2.7	2.25	4.0
Ammonium nitrate (33.5-0-0)	0.45	1.05	0.9	2.1	1.35	3.2
Urea (46-0-0)	0.35	0.9	0.7	1.8	1.05	2.7
16-20-0	0.95	1.8	1.9	3.6	2.85	5.4
16-16-16	0.95	1.65	1.9	3.3	2.85	5.0
12-12-12	1.25	2.4	2.5	4.8	3.75	7.2
19-9-0	0.8	1.65	1.6	3.3	2.40	5.0

[1]: 1 cup= 8 ounces

Cross section through raised bed.

Make a small groove an inch or two deep on both shoulders of the bed, 4 to 6 inches from the plant row, band in the fertilizer, replace soil, and irrigate.

Fertilizers can also be scattered along the bed shoulders. This is less efficient than the banding method, but will be more practical when the plants are so large that the bed shoulders are inaccessible for banding.

Where sprinklers are used, fertilizer may be scattered on the soil surface between rows before irrigating.

Where drip or trickle tubes are used, apply fertilizer on the soil surface near the drip tube.

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UCCE Master Gardener Joyce Gemmell's Seed Catalog Recommendations

Name	Website	Comments
Baker Creek Heirloom Seeds	www.rareseeds.com	Heirloom Seeds
Burpee	www.burpee.com	Wide selection of seeds and supplies.
Nichols Garden Nursery	www.nicholsgardennursery.com	West coast seed provider.
Native Seeds	www.nativeseeds.org	A non-profit organization that saves authentic Greater Southwest heirloom seeds.
Park Seeds	www.parkseed.com	Wide selection of seeds and supplies.
Renee's Garden Seeds	www.reneesgarden.com	Heirloom and gourmet vegetable and flower seeds.
Stokes Seeds	www.stokeseeds.com	Wide selection of seeds and supplies.
Seed Savers Exchange	www.seedsavers.org	Non-profit organization dedicated to saving and sharing heirloom seeds.
Territorial Seed Company	www.territorialseed.com	Wide selection of seeds and supplies.
The Cooks Garden	www.cooksgarden.com	Seed and plant information for the gourmet gardener.
Thompson and Morgan	www.tmseeds.com	Wide selection of seeds and supplies.
Totally Tomatoes	www.totallytomato.com	Tomatoes, vegetables, berries and seed supplies.

Master Gardener Association of San Diego County supports the University of California Cooperative Extension Master Gardeners of San Diego County

Scale of Heat: The Chile Pepper

(Notes from the Smithsonian, April 2009)

"The scale that scientists use to describe a chili's heat was developed in 1912 by Wilber Scoville, a chemist at Parke Davis Pharmaceutical Company in Detroit. He would dilute a pepper extract in sugar water until the heat was no longer detectable by a panel of trained testers; that threshold is it's Scoville rating. A bell pepper, for instance, merits a zero, while a typical jalapeño falls between 2,500 and 8,000 Scoville heat units (SHU's). In 2008, the naga jolokia, which is cultivated in India, rated a whopping one million SHU's. What's remarkable is that this variation can occur within a single species. The Cayenne pepper, C. annuum—0,000 SHU's—is the species from which countless domesticated varieties of bell peppers, jalapeños, and poblanos were derived".

Source: What's so hot about Chili peppers? Brendan Borre. April 2009. *Smithsonian Magazine*, p. 77.

Short Season
Tomato: Low- Temperature Varieties

Low temperature tomato varieties set fruit as low as 38° F and ripen in 60 days. Most catalogs carry the 50-55 D Swedish import, Glacier, and the three varieties developed by Oregon State University at Corvallis, Oregon Spring, Legend, and Santam will take a few freezing nights. Stupice imported from Czechoslavaka is another cold tolerant tomato that has been grown here in San Diego County along the coast and does well. Another low temperature variety is the Parare Fire developed at the University of Idaho and Siberia Russian import found in Canada (Olds, Alberta) in 1982.

Stupica, Glacier, and Siberia all had conflicting reports on flavor and size in different cold areas. However, gardeners in northeastern San Diego County don't usually plant their transplants until May (should try some of these: Ramona, Campo, Valley Center). The east county-"back county" areas that are at higher elevation or north exposure slopes might also find one of these cold adapted varieties to give an earlier crop.

Remember that any of these short maturity types are not going to have time to produce a large bush and large fruit. They are determinate plants with small sweet fruit, but won't set in hot weather. Replanting a later crop to mature at 72 to 82 days would extend the season.

We have little information on varieties of tomatoes that have acceptable yield in short season areas of the county. If you would like to try one of these, please see the spreadsheet.

Photoperiodism

Photoperiodism is a plant's response to relative length of dark and light. Even though we refer to plants as long-day, short-day, or day-neutral, it is the length of night that triggers the response. Poinsettias are a common example of blooming time as photoperiodism response. Many other plant processes are controlled by photoperiodism. These include: fruit and seed maturation, vegetative growth, bulb and tuber formation, branching, leaf abscission and preparation for dormancy. The lack of any of these processes can change the value of the plant, or in the case of dormancy, actually result in damage or death when the native and introduction areas vary significantly in length of night.

Want to orient your garden North and South? Here is a procedure for finding true north.

- Check your local newspaper for time of sunrise and sunset.
- Average those times to determine solar noon. Solar noon is halfway between sunset and sunrise, when the sun reaches its highest elevation and lies in the direction of true south.
- Plant a small stick or pipe on the property.
- Mark the stick's shadow at solar noon. This is the direction of true north.

Source: *The Visual Handbook of Building and Remodeling* by Charlie Wing, Rodale Press, Emmaus, PA, 1990, ISBN 10: 087857901X / ISBN 13: 9780878579013.

GROWING VEGETABLES IN CONTAINERS

It is possible to grow almost all vegetables in containers. It can overcome soil problems, lack of space, bending, if you have back problems, and digging. I have grown everything from sweet corn and tomatoes to salad mixes and cane berries in containers. All you need are big pots, a place to put them where they get at least six hours of sun, and a sterile potting mix.

Special Requirements for Plants in Containers

1. A constant supply of moisture (as much as twice a day). Try drip.
2. Regular feeding every 10 to 14 days (dilute liquid)
3. Plants are sensitive to temperature extremes
4. Protect from wind, screen to prevent tipping and wilting
5. Protect from heat buildup on a dark plastic pots (shade, group, or paint)
6. Light from one direction? Turn pots for even growth

Select Container Size for Vegetables

Vegetables with extreme root systems such as cucumbers, squash, tomatoes, and potatoes need maximum depth. (A half barrel is 162'' deep and 23'' in diameter). Most root and leafy crops can be grown in 9'' to 12'' deep containers. Anything less than 9'' is not recommended because of the difficulty in keeping the soil moisture up. Example: carrots should have a pot depth twice as deep as their length at maturity; 6'' carrot- 12'' pot.

Yield is affected by pot size. Summer squash grown in both a 5 gallon pot, 10x12'' deep, and 18x16'' deep fiber pot, yielded 4 times as much in the larger pot.

Types of Containers Available

Concrete, plastic, wood, and fiber pots are available at nurseries and other outlets. Avoid unglazed clay because they lose moisture too fast. Black plastic nursery containers, 5 to 15 gallons are all right if the sides are shaded with two coats of white water based latex paint on the outside. In hot climates use light colored pots or paint them. Clay dries faster in hot climates and if left on the ground, roots grow into ground. However, fiber pots are least expensive for pots of comparable size. Pot depth should be 9, 12, 14, 16, or 18 inches deep. If you are handy with tools, home made boxes enable you to "tailor" sizes to fit the crop.

Why Not Garden Soil for Containers?

1. Too little air (oxygen) in clay and slit soils, soil diseases and insects, weed seeds and too heavy to move.
2. Most soils in containers have poor drainage due to the shallow depth; the gravity source is lacking. If you use homemade compost add perlite to aerate it.
3. If you buy a good potting soil in bags it is sterile, has good moisture holding capacity and drains well. If you need a large amount for several barrels or other containers it might be more economical to make your own mix. Follow a recipe. Call the County Cooperative Extension office for soilless mixes developed by the University of California. Be sure to mix the ingredients on a clean cement area, like the driveway. Moisten as you mix, and don't over mix. To store, use plastic bags or garbage cans with lids to keep the mix from drying out.

Which Vegetables to Try

Remember to grow the right vegetables for the season. Certain varieties grow best in warm seasons and others in cool. Vegetables that need heat to mature fruit are tomatoes, cucumbers, eggplant, melons, and corn. For a list of vegetables suited to your climate and planting dates, call the Master Gardeners at the County Cooperative Extension office at 858-694-6910.

List of Varieties and Seed Source

It is not necessary to restrict your vegetable varieties to the "space-saver" or small varieties advertised for container growing. However, some of the genetic dwarf types do very well in pots and are prolific. The usual vining type vegetables, such as cucumbers, melons, pole beans, and indeterminate tomatoes, are hard to control in limited space above ground unless some form of support is provided. Varieties that have smaller or more compact form with standard size fruit are easy to care for.

Water and Fertilize on a Regular Basis

Nutrients are leached out of containers' soil with every watering and need to be replaced every 10 to 14 days with light dilution of a complete soluble fertilizer, even if you have added fertilizer in your initial planting mix. The supplement is necessary. Check the soil daily to make sure it is moist, not wet. During hot weather it may be necessary to water twice a day. If you plant seeds, the top 2'' of soil must be kept moist until germination takes place. As summer temperatures rise and plants are blooming and setting fruits, fluctuations in moisture will cause flowers to drop, fruit to shrivel, and blossom-end rot on tomatoes and peppers will occur. Use spray or bubbler on the end of the hose to avoid washing the soil out of containers. Water in the morning so that plants have a chance to dry off before the heat of the day. This will also prevent fungal and bacterial disease. If the soil becomes compacted with roots, punch a few holes in the top of the soil with a sharp plant stake so water will penetrate the root ball and add some mulch to the soil surface.

Pest and Disease Control

Unfortunately, container plants are more susceptible to pest and disease. Insect problems can be controlled with hand picking, washing the foliage with plain water or spraying with an insecticidal soap formulated for vegetables. Keeping susceptible plants in areas with good air circulation can control fungal disease, like mildew. Moving a sick plant to an isolation area is a good idea, at least until you determine what the problem is. If you must spray with a chemical pesticide, be sure to read the label to make sure the specific vegetable you want to use it on is listed on the label. Check the dilution rate and the harvest interval.