



part two

Growing Plants OutdoorsLAURA WILLIAMS RICE
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- 6 Outdoor Soils and Fertility
- 7 Diagnosing and Treating Outdoor Plant Disorders
- * 8 Vegetable Gardening
- 9 Growing Tree Fruits and Nuts
- 10 Bush and Other Small Fruits



SEVENTH EDITION

**PRACTICAL
HORTICULTURE**



OBJECTIVES

The student will be able to...



*8

Vegetable Gardening

- State the three classifications of vegetables by part eaten.



OBJECTIVES

The student will be able to...

- Select a site for a vegetable garden and explain what makes this site suitable.
- Design a vegetable garden for the needs of two people using the vegetable crops most commonly grown and consumed in the area.
- Describe three methods of weed control in a vegetable garden and explain why weed control is so important.
- Specify which vegetables most often need to be trained and explain how each is trained.





OBJECTIVES

The student will be able to...

- Make a “frost cap” or other frost-protection device.
- Find three mulch materials used in the area and evaluate whether each is suitable for a vegetable garden.
- Explain the growing requirements for cool-season and warm-season vegetables.
- Define post-harvest handling and list four steps that it includes.





OBJECTIVES

The student will be able to...

- Define the concepts of...
 - Succession cropping.
 - Days-to-maturity designation of a vegetable crop.
 - Interplanting.
 - Hill planting.
 - Outline the basic steps in commercial field production of vegetables.





VEGETABLE GARDENING

- Most people will argue that “home grown” tastes much better than “store bought.”
- Many commercial cultivars are bred to be less juicy, and must be picked & shipped while not completely ripe in order to reach the consumer undamaged.
 - This frequently diminishes the ultimate flavor quality.
 - From the moment a ripe vegetable is picked, quality normally will begin to deteriorate slowly.



VEGETABLE GARDENING

- Studies show a vegetable plot of a given size will supply all the vegetable needs of a family for a year.
 - True with intensive, systematic cultivation & conscientious use of all vegetables as they become available.
 - For most families it will not hold true.
- It is more reasonable to regard a vegetable garden as a money saver, with recreational value, that provides superior-quality vegetables.
 - Harvested and eaten at their prime.





TYPES OF VEGETABLES

- Like all other plants, vegetables are annual, biennial, or perennial, with most in the annual group.
 - Including peppers, squash, and beans.
- Others technically are biennials, treated as annuals because only the vegetative parts are eaten.
 - Such as beets.
- Still fewer are perennials, like asparagus & rhubarb.
 - The tomato is a perennial, but is not frost-tolerant.
 - Therefore, treated as an annual.





TYPES OF VEGETABLES

More important than whether a vegetable is annual or perennial is its classification as either warm or cool season.

Table 8-1
GARDEN VEGETABLE CULTIVATION

Vegetable	Cool/ warm season	Grown as annual, perennial	Edible portion	Moderate planting for family of four	Distance between plants	Distance between rows
Artichoke, globe	Cool	Perennial in zones 9–10, annual in others	Flower buds	3 or 4 plants	4' (1.2 m)	5' (1.5 m)
Artichoke, Jerusalem	N/A	Perennial	Tubers	10–15 plants	1' (0.3 m)	5' (1.5 m)
Asparagus	N/A	Perennial	New shoots	30–40 plants	1' (0.3 m)	5' (1.5 m)
Bean, lima	Warm	Annual	Fruit	15–25' (5–8 m) row	6" (15 cm) (bush) 2' (0.6 m) (pole)	30" (0.5 m)
Bean, snap or green	Warm	Annual	Fruit	15–25' (5–8 m) row	3" (8 cm) (bush) 2' (0.6 m) (pole)	2' (0.6 m) 2' (0.6 m)

See the entire table on pages 132-133 of your textbook.



TYPES OF VEGETABLES

- *Warm-season* vegetables thrive at daytime temperatures ranging from 65 to 90 deg F.
 - Nighttime lows not less than about 55 deg F.
- At lower temperatures they grow slowly, and some, like tomatoes, fail to develop fruit.
 - Others, like peppers, produce only small fruits that are not fleshy or full.
 - These vegetables will not live through a frost.





TYPES OF VEGETABLES

- *Cool-season* vegetables will tolerate light frost and grow best in day temperatures of 50 to 65 deg F.
 - In warmer weather, quality is often poor.
 - Lettuce may become bitter.
- Some cool-season vegetables will flower when leaves alone are wanted, which is undesirable.
 - Called *bolting*, it is a response to shortening of the nights and the warmer weather during the summer.





TYPES OF VEGETABLES

- A factor affecting the culture of vegetables is whether they are grown for roots, leaves, or fruit.
- Leaf vegetables produce best with nitrogen-rich fertilizer, which encourages vegetative growth.
 - Root and fruit vegetables, are best with less nitrogen.
 - Excess nitrogen will prevent some vegetables from bearing.
- Leaf & many root vegetables can be successful in semi-shady areas.
 - Fruit-producing vegetables generally require full sun, as they are unable to photosynthesize carbohydrate for flowering and fruiting without bright sunlight.



- Vegetable gardening is considered a spring and summer activity by most people.
 - Seed sowing in spring & harvest until the first killing frost.
- The mild-winter areas of North America are its vegetable bowl, producing most fresh vegetables for winter consumption.
 - Climate characteristics of the locale will determine which vegetables can be raised in each season.
- In mild-winter areas of the country, vegetable gardening continues all year.





CLIMATIC FACTORS

Vegetable Gardening in Mild-Winter Areas

- In the Deep South, cool-season vegetables can be raised in winter, and warm-season vegetables in the summer.



Figure 8-1 Areas of the continental United States where vegetables can be grown throughout winter.



CLIMATIC FACTORS

Vegetable Gardening in Mild-Winter Areas

- In the Florida Keys—the only tropical area of North America north of Mexico—winter temperatures are 50 to 75 deg F, high enough for warm-season vegetables, but not too high for cool-season varieties.
 - In the summer only warm-season crops can be grown.
- Along much of the California coast, temperatures are moderated by the Pacific Ocean, with a minimal difference between winter & summer temperatures.
 - Often just short of the warm-season acceptable range, gardeners in this area grow primarily cool-season crops.



CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- Most areas of the U.S. and Canada have widely varying winter and summer temperatures.
 - Spring & fall are the best for cultivating cool-season crops
 - Summer is most conducive for raising warm-season crops.
- The average number of days from the last spring frost until the earliest fall frost defines the period of growing warm-season crops.
 - This *frost-free* period varies widely with latitude, from 250 days in the Deep South to 60 in parts of North Dakota.
 - The importance of knowing the number of frost-free days is in its relevance to selection of warm-season crops.



CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- Days to maturity is the number of days from either seed or transplant (depending on the vegetable) to the time when the crop is ready for harvest.
- Benefits of fast-maturing vegetables to gardeners in the far North are obvious.
 - Gardeners in more moderate climates value fast-maturing vegetables as they are ready for harvest earlier.
- Cool-season vegetables are not restricted to the frost-free period.
 - Not only tolerant of light frost, their flavor may actually be improved by it.





CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- Extending the vegetable gardening season is largely a matter of taking advantage of the spring & fall growing periods.
 - Which have occasional frosts but are generally favorable for the growth of cool-season vegetables.
- Early spring is fine for sowing peas, lettuce, carrots, and other cool-season vegetables grown from seed.
 - Also ideal for setting out transplants of broccoli, cabbage, or cauliflower, which may appear to grow slowly at first.
 - They will establish roots and grow faster later in the season.
 - Planting time for cool-season crops starts as soon as the ground is thawed and dry enough to be workable.



CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- Fall vegetable gardening is a second way to extend the growing season, involving delaying planting of cool-season vegetables.
 - So they mature after the rest of the crops are harvested.
- Cool-season vegetables started as transplants in spring are usually seeded when grown for fall crops.
 - Adds 6 to 8 weeks to the days-to-maturity designation and must be factored in when deciding the date to sow seed.





CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

The following vegetables are suitable for summer sowing and fall harvest:

Beets	Kohlrabi
Broccoli	Leeks (sow in spring or over wintered seedlings)
Cabbage	Lettuce (leaf and semihead)
Carrots	Mustard greens
Cauliflower	Parsnips (sow in spring)
Chard	Peas, English and edible pod
Chinese cabbage	Radishes
Collards	Spinach
Endive	Turnips
Kale	

Leaf lettuce & radishes may be started in late summer or even fall, as they mature quickly.

Slower crops should be seeded in early summer.



CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- The cold tolerance of some root vegetables comes as a surprise to many gardeners.
 - It is not unusual to discover these vegetables growing through the snow in spring and still good to eat.
 - Occasionally leaf vegetables such as lettuce & parsley will remain green under snow cover & renew growth in spring.
- This overwintering phenomenon is due to the cold hardiness of the vegetable itself, insulating effects of snow cover and the latent heat of earth
 - When these conditions combine, soil may remain unfrozen or just at freezing all winter.





CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- It is possible & practical to use of these conditions to store root vegetables in the ground and extend their harvest through winter.
- A section of garden should be set aside for the winter harvest area & planted with root vegetables.
 - Beets, carrots, Jerusalem artichokes, leeks, parsnips.
 - Large radishes, rutabagas, turnips.
- In fall the area should be mulched with compost, newspapers, leaves, or any other suitable material.
 - Depth of the mulch needed to prevent freezing will depend on the expected winter temperatures.





CLIMATIC FACTORS

Vegetable Gardening in Temperate Climates

- The winter garden can be located near the house in a protected area to preserve the ground heat.
 - Harvest of the vegetables can begin any time.
 - Mulch should be removed, the roots harvested, and the mulch replaced each time.





PLANNING A VEGETABLE GARDEN

Choosing the Area

- A potential vegetable area should have fast-draining soil for vigorous root growth and full sunlight to encourage maximum growth rate and flowering.
- A previously gardened area probably will possess better soil than one that has been planted in grass.
 - Any soil could be improved to a suitable quality by adding amendments, or by *green manuring*.





PLANNING A VEGETABLE GARDEN

Determining the Size of the Garden

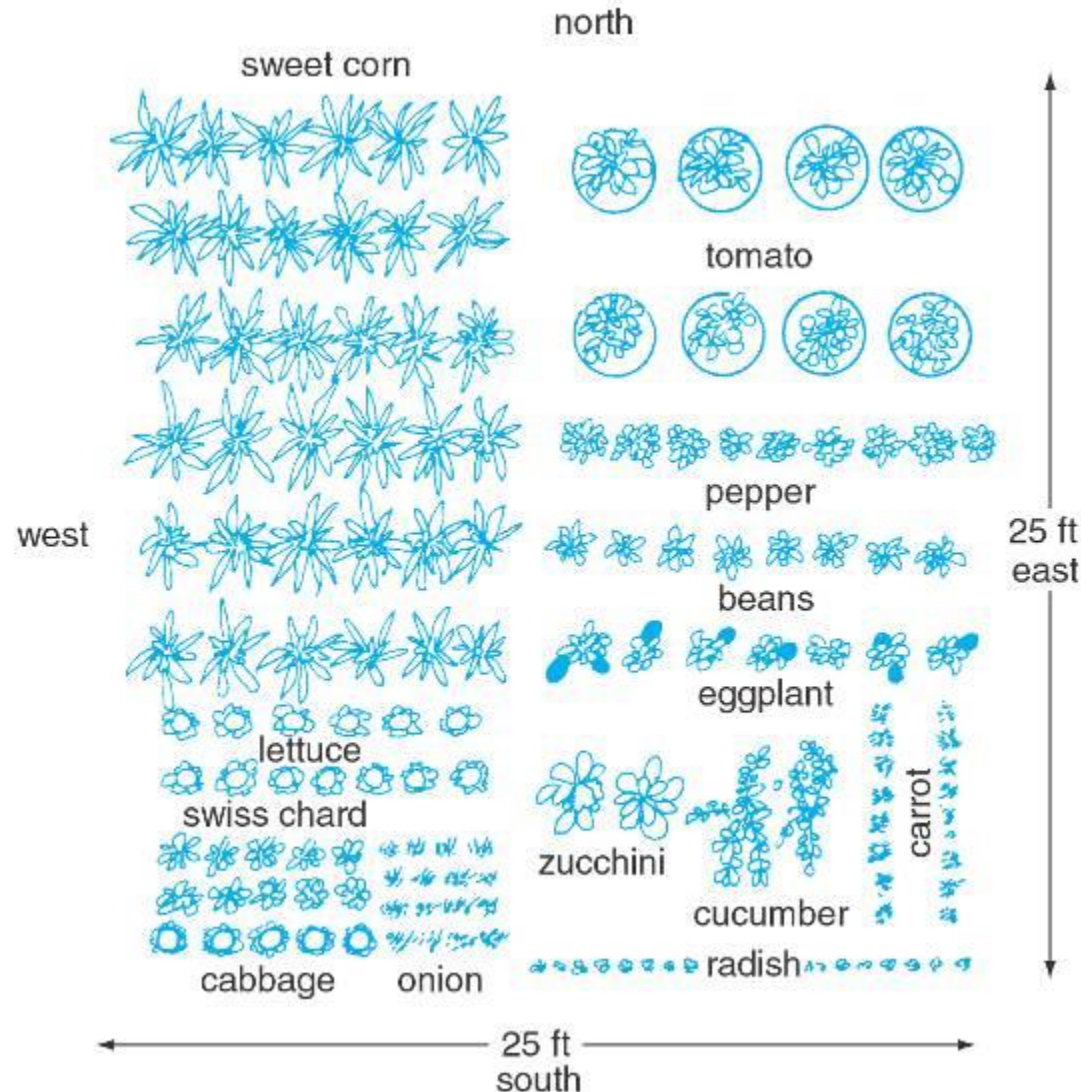
For an inexperienced gardener, a small plot is preferable to a large one.

A 25 x 25 foot plot will enable a first-timer to grow most popular vegetables except large space consumers like melons and potatoes.



Figure 8-2

A typical vegetable garden plan.

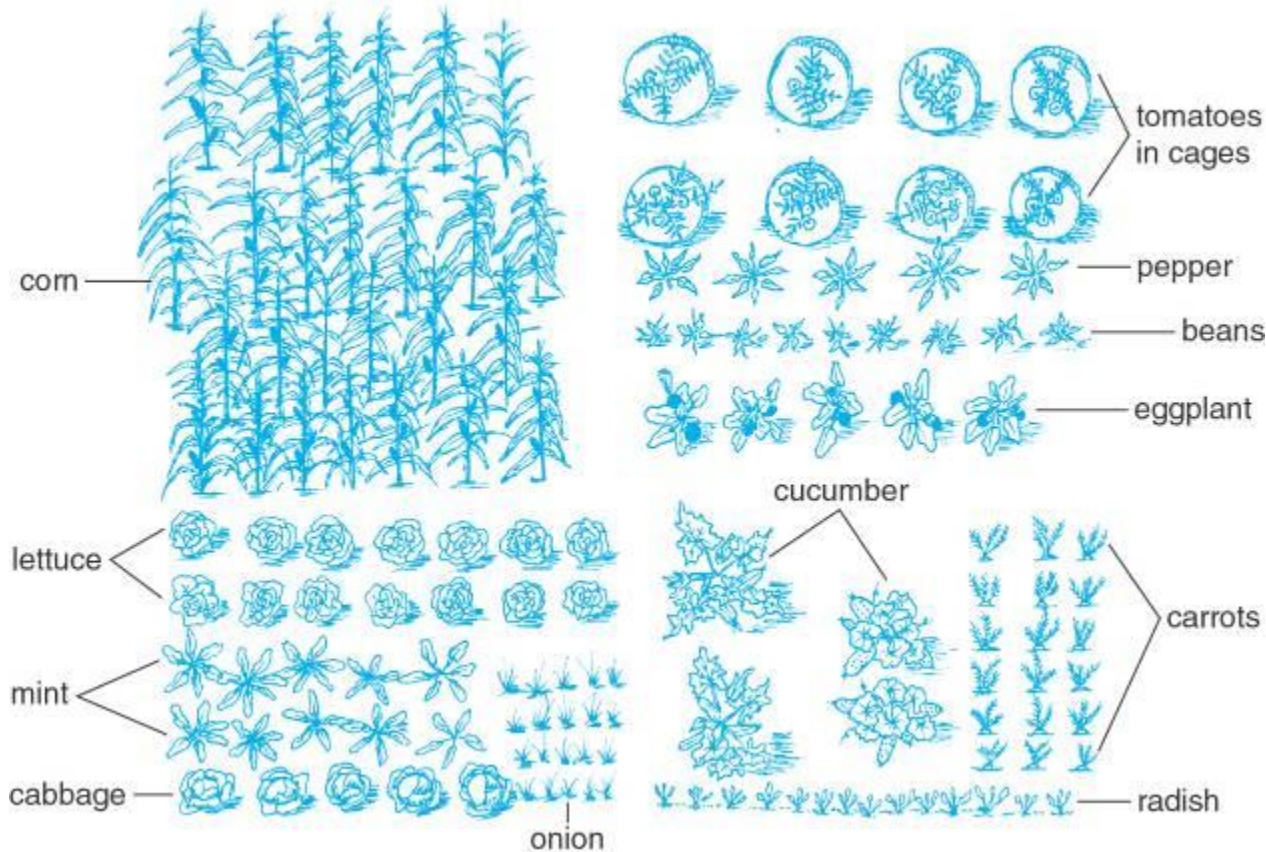




PLANNING A VEGETABLE GARDEN

Garden Layout

The first tasks are to decide which vegetables will be grown & lay out on paper where they will be located.



Rows should be planted running east & west, to prevent shading.

Taller or trellised crops should be placed north & shorter crops to the south.



Figure 8-3 A block garden made of four blocks. Drawing by Bethany Laypart.



PLANNING A VEGETABLE GARDEN

It is often difficult to estimate how much of each vegetable to plant, shown is an average planting for a family of four.

Table 8-1
GARDEN VEGETABLE CULTIVATION (continued)

Vegetable	Cool/ warm season	Grown as annual, perennial	Edible portion	Moderate planting for family of four	Distance between plants	Distance between rows
Endive	Cool	Annual	Leaves	10–15' (3–5 m) row	10" (25 cm)	18" (0.5 m)
Kale	Cool	Annual	Leaves	10–15' (3–5 m) row	10" (25 cm)	2' (0.6 m)
Kohlrabi	Cool	Annual	Enlarged stem base	10–15' (3–5 m) row	3" (8 cm)	2' (0.6 m)
Leek	Cool	Annual/ perennial	Enlarged stem base	10' (3 m) row	2" (5 cm)	2' (0.6 m)
Lettuce	Cool	Annual	Leaves	10–15' (3–5 m) row	12" (0.3 m) (head) 6" (15 cm) (leaf)	2' (0.6 m) 2' (0.6 m)
Melon	Warm	Annual	Fruit	5–6 hills	6" (15 cm)	6' (2 m)
Mustard green	Cool	Annual	Leaves	10–15' (3–5 m) row	8" (20 cm)	18" (0.45 m)
Okra	Warm	Annual	Fruit	5–6 hills	6" (15 cm)	6' (2 m)

See the entire table on pages 132-133 of your textbook.



PLANNING A VEGETABLE GARDEN

Garden Layout

- It is best to divide the amount to be planted into two or three parts, and stagger sowing of seed so the harvest is continuous throughout the season.
 - This *succession cropping*, will ensure a steady supply of vegetables instead of an overabundance at one time.
- Succession cropping requires careful management and more work than a straight plant/harvest method.
 - Crop rewards are greater throughout the season.
- Almost all vegetables except slow-maturing, warm-season crops can be succession cropped.





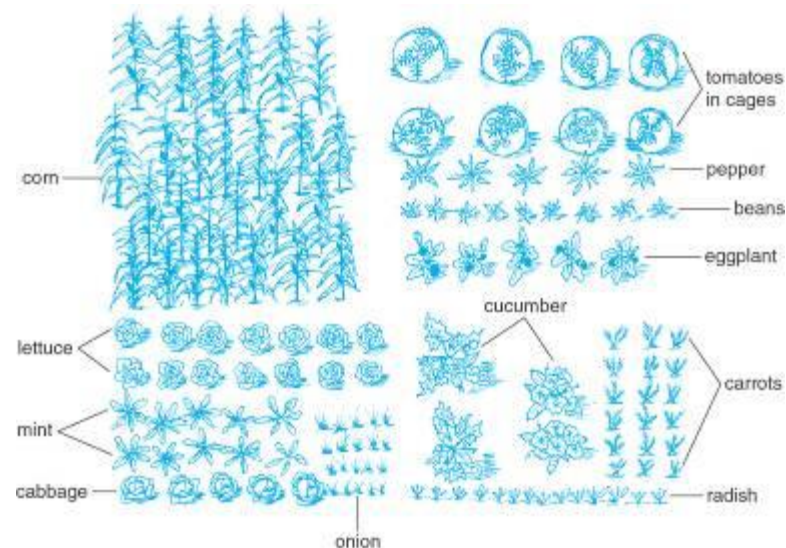
PLANNING A VEGETABLE GARDEN


Garden Layout

In *intensive* or *block* gardening vegetables are grown in blocks rather than rows.

The original form of gardening practiced before the plow was invented, and still popular in countries where land is scarce.

In the U.S & Canada, it is useful in cities, because it gives maximum yield from minimum space.



 **Figure 8-3** A block garden made of four blocks.
Drawing by Bethany Laypart.

Block planting should consist of squares or rectangles no more than 4 feet across to keep plants within reach of the path.

Seed is sown by scattering it evenly over the area or in row fashion.



PLANNING A VEGETABLE GARDEN

Garden Layout

A variation of the original block garden involves growing vegetables in raised beds.

The soil in these beds is conditioned and fertilized thoroughly to grow superior-quality crops.



Figure 8-4 A block garden made with raised beds. Author photo.





PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing

- Seed catalogs list numerous cultivars & their merits.
 - But say little about their drawbacks.
- The Cooperative Extension Service of most states evaluates new & existing vegetable cultivars yearly.
 - A list of recommended cultivars is made publicly available.
 - A most important information source for gardeners.
- The gardener must evaluate cultivar suitability to his/her needs and climate, noting days to maturity, resistance to disease, and other characteristics.
 - Use catalogs from companies located in a climate similar to one's own.





PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing

- Many people buy seeds from grocery/nursery racks.
 - A seed rack may have a limited selection of cultivars.
 - All or none of which may be recommended for the area.
 - If the stamped date is not the current year, the seed is old and may germinate poorly.






PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing

Seed tape is an expensive way to purchase seeds but will save labor.

The seeds are sandwiched between layers of plastic-like material that dissolves when the row is irrigated.

 **Figure 8-5** Using seed tape to plant a row of vegetables. Photo courtesy of W. Altee Burpee & Co., Warminster, Pa.





PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing

- Overbuying vegetable seed is a common mistake resulting in leftover seed at the end of the season.

Most vegetable seeds can be stored in the refrigerator for the following season.

Table 8-2

**APPROXIMATE LIFE OF VEGETABLE SEEDS
STORED UNDER COOL CONDITIONS**


Vegetable	Years	Vegetable	Years
Asparagus	3	Leek	3
Bean	3	Lettuce	5
Beet	4	Muskmelon	5
Broccoli	5	Mustard	4
Brussels sprout	5	Okra	2
Cabbage	5	Onion	1–2
Carrot	3	Parsley	2
Cauliflower	5	Parsnip	1–2
Celery	5	Pea	3
Chard, Swiss	4	Pepper	4
Chinese cabbage	5	Pumpkin	4
Collard	5	Radish	5
Corn	1–2	Rutabaga	5
Cucumber	5	Spinach	5
Eggplant	5	Squash	5
Endive	5	Tomato	4
Kale	5	Turnip	5
Kohlrabi	5	Watermelon	5



PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing




 **Figure 8-6** Kale and red lettuce used in a flower bed with cock's comb.

Cultivars of vegetables selected for their colorful flowers, foliage, or fruits are available through seed catalogs.

Vegetables can be used not only for eating but also as ornamentals.



 **Figure 8-7** A potted pepper (right) mixes in with pots of marigolds. Photos courtesy of National Garden Bureau, Downer's Grove, Ill.



PLANNING A VEGETABLE GARDEN

Vegetable Cultivar Selection & Seed Purchasing

- Using vegetables as ornamental plants, gardeners with space restrictions can also make better use of a limited area of land.

Table 8-3
ORNAMENTAL VEGETABLE VARIETIES

Vegetable	Ornamental species or cultivars	Remarks
Artichoke	<i>Cardunculus</i> species (common name, cardoon)	Large gray leaves and thistlelike purple flowers; petioles and roots are edible
	<i>Scolymus</i> species (common artichoke)	Purple flower heads, gray foliage; smaller plant than cardoon
Artichoke, Jerusalem	Any	Mature plants are 6 ft (2 m) or more tall with yellow sunflowers
Asparagus	Any	Feathery foliage and red berries in fall
Bean, bush	'Royalty'	Purple pods
Bean, pole	'Scarlet Runner'	Red flowers; shade- and cool-temperature-tolerant
Cauliflower	'Purple Head' and 'Royal Purple'	Heads tinged lavender at maturity
	'Greenball'	

See the entire table on page 139 of your textbook.



PLANNING A VEGETABLE GARDEN

Soil Preparation

- If an area was gardened previously & soil condition is good, little preparation will be needed.
 - Except for pulling or killing weeds and mixing in fertilizer before planting, called *pre-planting incorporation*.
- Annual weed seedlings can be controlled by simply scraping the soil surface with a hoe.
 - Provided seedlings are small enough to cut off at soil level.
- An area should *not* be dug to eliminate annual weeds, which exposes new seeds.
 - And encourages them to germinate.





PLANNING A VEGETABLE GARDEN

Soil Preparation

- Perennial weeds that have come back from the roots can be dug out individually, if they are few.
 - Treated with a weed killer if they are numerous.
 - A local nursery can recommend a chemical.
- The nursery needs to know the area will be planted as a vegetable garden.
 - So a chemical with a short effective period (called its *residual life*) can be selected, and not affect the crops.





PLANNING A VEGETABLE GARDEN

Soil Preparation

- If the area was previously a lawn, the sod must be removed.
 - If preparation is begun in fall, it can be turned under and allowed to rot in place.
- Eliminating lawn grass with a weed killer is required if it contains vigorous species spread by rhizomes.
 - It is nearly impossible to remove all rhizomes by hand and any left will resprout continually & create a weed problem.
- After sod removal it may be necessary to mix in organic matter to improve the structure of the soil.
 - Nurseries sell various soil conditioners for this purpose.



PLANTING THE GARDEN

Sowing Seed

- With the exception of block gardening, vegetables grown from seed are planted in rows or hills.
 - Each row should be marked with a labeled stake and seed sown thickly, following package directions.
 - Heavy sowing ensures a sufficient stand of plants in case of poor germination.
- With slow-germinating seeds such as carrots, a fast-germinating seed can be planted in the same row to mark its location until the other seedlings emerge.
 - Radishes are often used for row marking as they germinate in 3 days.





PLANTING THE GARDEN

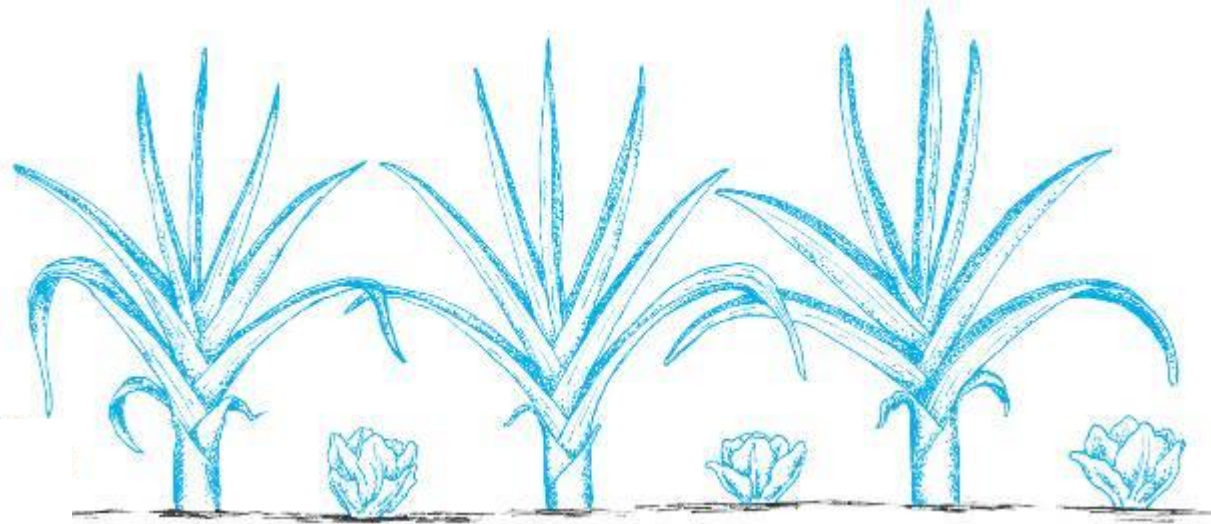
Sowing Seed

- Because radishes mature in as little as 21 days, they can be harvested in time to prevent crowding of the main crop.
 - Called *interplanting*, this saves space is often done with small, fast-maturing crops like radishes and leaf lettuce.

A full leaf lettuce crop can be raised by seeding between transplants of leeks.



Figure 8-8 Leaf lettuce planted between leeks.
Drawing by Bethany Layport.





PLANTING THE GARDEN

Sowing Seed

- Directions for squash & vining vegetables like cucumbers normally specify planting in *hills*.
 - *Hill planting* refers to grouping several plants together.
 - Not planting seeds in a mound of soil.
- After seeding, keep the surface of the soil moist.
 - Drying of the soil surrounding the germinating seeds will kill the emerging seedlings and necessitate resowing.





PLANTING THE GARDEN

Buying Transplants

- Selecting well-grown transplants contributes to the success of the garden.
 - Plants should be short & sturdy with foliage to the base.
- Yellowed foliage or bare stems should be avoided as they have been growing too long in the container.
 - Likely to be root-bound and slow to begin growth.
 - In some cases they will flower prematurely and there will be no crop because the plants are not large enough to bear fruit.





PLANTING THE GARDEN

Setting Out Transplants

- If possible, an overcast day or early evening should be selected for transplanting to lessen shock.
 - Water plants before removing them from the pack.
- After planting, the transplants should be watered with *starter fertilizer*.
 - The watering ensures full soil contact with the roots and provides maximum soil moisture to prevent shock.






PLANTING THE GARDEN

Setting Out Transplants

- If a transplant is found to be root-bound, the root ball should be cut shallowly on each side.
 - The cutting will force branching of the roots into the soil.



If uncut, the roots may continue growing within the original soil ball, and establishment will be slow.

 **Figure 8-9** Cutting through the wrapped roots of a pot-bound transplant. Photo by Rick Smith.





PLANTING THE GARDEN

Setting Out Transplants

- Transplants grown in pots of compressed peat moss can be transplanted with the pot intact
 - Break the top of the pot off down to the soil.
- If the rim is exposed to the air, it will wick water from the peat pot, restricting root penetration.
 - Slowing growth.
- Vegetable transplants should be planted slightly deeper than they were grown originally.






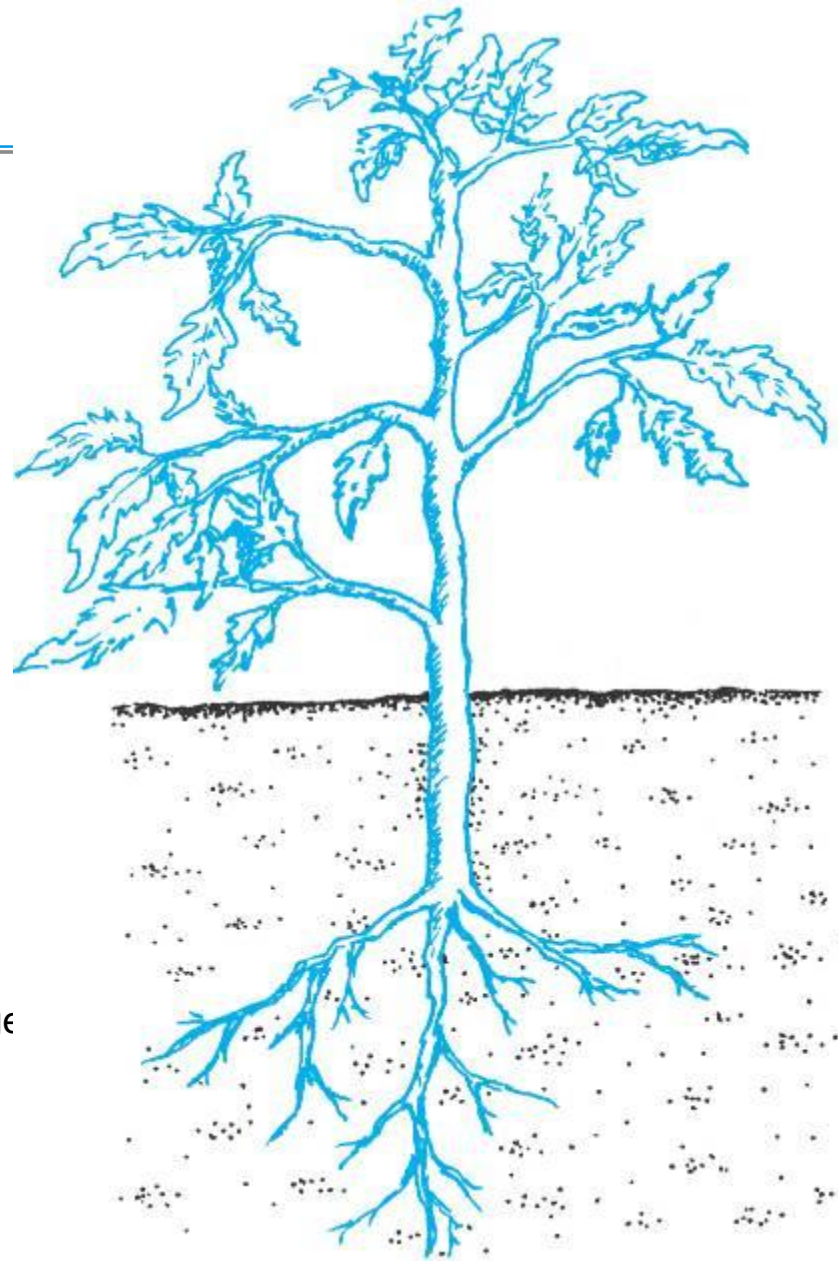
PLANTING THE GARDEN

Setting Out Transplants

Tomatoes should be set with much of the stem below the soil surface because they will form adventitious roots along the submerged stem.

The stem roots create a larger root system & more vigorous plant.

 **Figure 8-10** Deep planting of a tomato encourage stem rooting. Drawing by Bethany Layport.





VEGETABLE GARDEN MAINTENANCE

Thinning

- *Thinning* is the removal of excess seedlings that are spaced too closely for best growth.
 - Thinning can be done either once or twice for each crop.



a.



b.



Figure 8-11 A group of radishes before (a) and (b) after thinning to the correct spacing. Photos courtesy of Kenny Point, Veggie Gardening Tips Blog at <http://www.veggiegardeningtips.com>



VEGETABLE GARDEN MAINTENANCE

Thinning

- One-time thinning should be done as soon as the leaves of neighboring plants touch.
 - And should remove as many seedlings as necessary to achieve the recommended final spacing for the vegetable.
- Twice-over thinning is practical for vegetables grown for their leaves.
 - Such as chard, lettuce, and Chinese cabbage.





VEGETABLE GARDEN MAINTENANCE

Thinning

- First thinning is done while the plants are seedlings.
 - It removes only enough plants to prevent severe overcrowding.
- Second thinning takes place 2 to 4 weeks later.
 - It thins the remaining plants to the final spacing.
 - By the second thinning, plants are large enough to be harvested and eaten.





VEGETABLE GARDEN MAINTENANCE

Weeding

- The detrimental effect of weeds shows up as slowed plant growth rate due to the competition of the crop with the weeds for water, nutrients, and light.
 - Many gardeners incorrectly attribute sluggish growth to poor soil or adverse weather, not knowing the real cause.
- As seedlings have limited root systems, they are vulnerable to competition from vigorous weeds.
 - Unchecked, weeds eventually crowd out desirable plants.
- If seedling plants are invaded by weeds, pulling is probably the only control method, with hoeing or mulching effective later.





VEGETABLE GARDEN MAINTENANCE

Mulching

- *Mulch* is a layer of plant-derived or synthetic material laid on the soil surface over plant roots.
 - Reduces time spent weeding considerably and will conserve soil moisture.
 - In hot areas, it helps keep soil from overheating.
- Many people use plant-derived mulches that will decay in the soil as gardens are tilled every year,
 - Compost, leaves, and grass clippings from lawns not recently treated with weed killer are satisfactory.
 - Newspapers, while not attractive, are readily available and inexpensive.





VEGETABLE GARDEN MAINTENANCE

Mulching

- Transplants should be mulched sparingly, about 1" deep when young, gradually increasing depth to 3" as the plants grow taller.
- Low-growing plants such as lettuce & radishes, should be mulched on either side of the row at a depth of 1.5" to 2" inches.
- Vining crops such as melons should be mulched over the entire area where the vine will grow.
 - Covering the area will help keep the fruits clean and reduce losses from rot diseases that occur when the vegetables lie on the soil.





VEGETABLE GARDEN MAINTENANCE

Mulching

- Plastic mulches speed up growth of warm-season crops, and can mature the crop a week or more ahead of normal.
 - Clear plastic mulch will raise the temperature more than black, however, weeds will grow beneath it.
 - Time gained using transplants combined with warmth provided by plastic encourages rapid growth/fruit set.
- For row crops, strips of plastic are laid on either side of the row, with the plants between.
 - For vegetables in hills, the area can be covered and a flap cut in the plastic so the shoots can emerge.





VEGETABLE GARDEN MAINTENANCE

Mulching

Plastic mulches are useful in northern vegetable gardens because they accumulate heat under the plastic in the sun & radiate it into soil underneath.



Figure 8-12 Laying a plastic mulch in a commercial field. Photo courtesy of USDA.



VEGETABLE GARDEN MAINTENANCE

Hot Caps and Frost Protection Devices

- *Hot caps*, paper or plastic domes set over plants in early spring, is another method of hastening growth.

The caps admit light, but insulate against heat loss, keeping the air around transplants several degrees warmer than outside air.

The slight rise in temperature is often enough to speed growth considerably during early spring.



Figure 8-13 A solar tent used to cover plants in the garden. Courtesy of Pinetree Garden Seeds, New Gloucester, Me.





VEGETABLE GARDEN MAINTENANCE

Watering

- Watering the vegetable garden should begin as soon as seeds are planted & done as often as necessary to prevent wilting.
- Large-leaved squash or cucumber plants can wilt repeatedly during the hottest part of the day.
 - Due to an inability to absorb enough moisture to compensate for enormous water loss through foliage.
 - A phenomenon called *diurnal wilting*.
- Watering the vegetable garden should soak the soil to a depth of about 18", with perennial vegetables such as asparagus & artichokes needing more.





VEGETABLE GARDEN MAINTENANCE

Fertilizing

- Fertilizer worked into the soil of the vegetable garden during preparation will often be sufficient to supply the needs of the crops to maturity.
- On sandy soils, those of low fertility, or if deficiency symptoms are noted, a midsummer sidedressing of balanced granular fertilizer may spur crop growth.
- Nitrogen fertilizers can stimulate leaf production at the expense of the fruit.
 - They should be used sparingly after plants have reached mature size.





VEGETABLE GARDEN MAINTENANCE

Training

- Peas, runner beans, tomatoes, and cucumbers are vining plants & be trained on stakes, strings, or wire



Training keeps the fruits from becoming dirty and can lessen chances of fruit rot by preventing contact of the fruits with the soil.

It also optimizes space usage in the garden & makes harvesting easier.



Figure 8-14 Training of cucumbers.





VEGETABLE GARDEN MAINTENANCE

Training

- *Teepee training* can be used for a group of several cucumber or bean plants.
 - Ideally the teepee should be built first and the seeds planted at the base of each stake.
 - Vines are tied to the stakes at 1-foot intervals.





VEGETABLE GARDEN MAINTENANCE

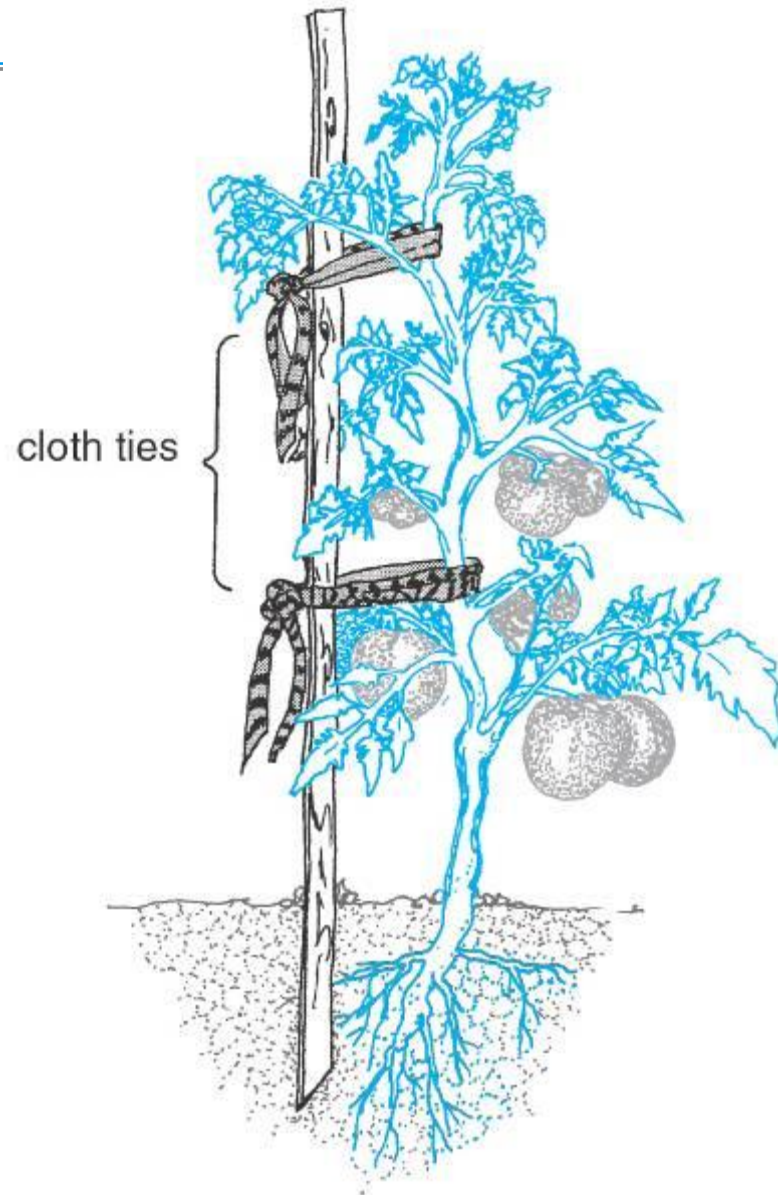
Training

- A single sturdy stake will support one tomato plant or 2 - 3 runner beans.

Beans will climb without help, but tomatoes should be tied loosely with pieces of cloth at intervals along the stem.



Figure 8-15 Staking is a common way to train tomatoes.





VEGETABLE GARDEN MAINTENANCE

Training

- Runner beans & peas are trained easily on a trellis made of twine strung between poles.

The poles should be pounded in deeply not more than 10 feet (3 meters) apart to provide a sturdy support for the trellis and vines.



Figure 8-16 A string trellis used to support peas. Photo by the author.





VEGETABLE GARDEN MAINTENANCE

Training

- Tomato cages using a wire-mesh cylinder either purchased or made at home are an easy way to support tomatoes.

Concrete reinforcing wire has ideal strength & good mesh size for tomato cages

Galvanized fencing is also suitable. (not chain link)

Tying vines is not required.



Figure 8-17 Tomato plants in cages.





CROP ROTATION

- *Crop rotation* is the planting of crops in different areas of the garden every year.
 - It deters buildup of disease organisms and insects associated with a particular crop.
 - A sound practice that does not require much effort.

The easiest form of crop rotation is to simply reverse the vegetable garden plan each year, being careful to avoid shading problems due to placement of tall plants.

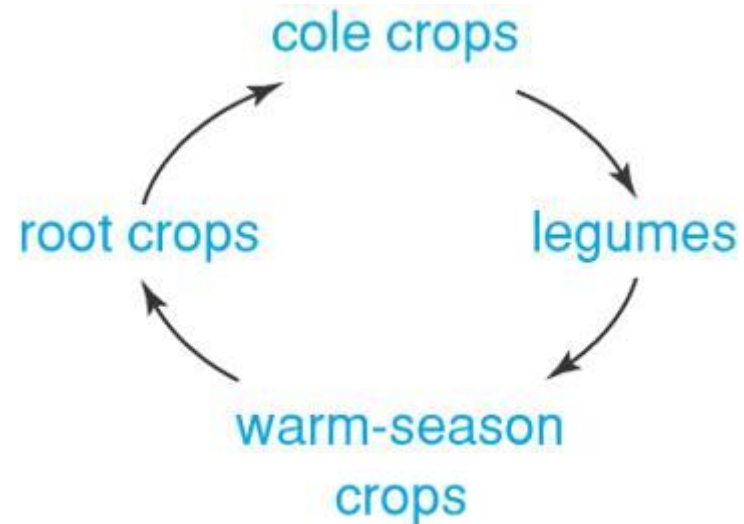


Figure 8-18 Suggested crop rotation for a home vegetable garden.



COVER AND GREEN MANURE CROPS

- *Cover cropping* is used to maintain fertility in established vegetable gardens.
 - In most areas of the country, cover crops are planted in fall over the vegetable garden.
 - Turned under in spring, supplying organic matter, increasing the fertility of the soil as they decay.
- *Green manure crops* perform similarly but are planted at any time of year.
 - Grown halfway to maturity & turned under to decay.
 - Green manuring can be used in place of organic soil amendments and is much less expensive.





COVER AND GREEN MANURE CROPS

- The general practice is to sow green manure crop, wait until it is 8" to 10" high, turn under & resow.
 - Plowing & resowing are repeated as many times as necessary until soil is of acceptable quality.
- Members of the pea family such as alfalfa, clover, cowpeas, soybeans, and some cultivars of vetch are among the best green manure and cover crops.
 - Winter-growing cover crops include wheat, rye, ryegrass, and buckwheat.
 - Buckwheat is very tolerant of adverse soil conditions and is especially useful in very poor soils.





COMMERCIAL FIELD VEGETABLE PRODUCTION

- Large-scale commercial vegetable production for the fresh market & for processing is spread through the U.S. during the summer months.
 - Some states focus on crops suited to their soils/climates.
- Celery is commonly produced in cooler parts of California near the Pacific Ocean.
 - Tomatoes are grown in the South in summer.
- During fall, production of vegetables for the winter fresh market shifts to the South & far West.
 - In the winter to Florida & California, Arizona, Texas, etc.



COMMERCIAL FIELD VEGETABLE PRODUCTION

- In Canada the main provinces producing vegetables are Ontario, Quebec, and British Columbia.
 - Greenhouse production of tomatoes, peppers & cucumbers is common in many states and Canada.
 - Few other vegetables are grown in greenhouses.





COMMERCIAL FIELD VEGETABLE PRODUCTION

- Vegetables to be sold fresh have a higher value than those to be processed.
 - Quality demand for fresh vegetables is very high, so they must be insect/disease-free for consumer acceptance.
 - The main vegetables sold fresh are onions, lettuce, tomatoes, celery, cabbage, sweet corn, & carrots.
- Vegetables to be processed can have mixed sizes, irregularities, or small amounts of insect damage.
 - Because these will not be seen in the finished product.
 - Main processed vegetables are peas, potatoes, tomatoes, corn, spinach, and beets.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- A commercial vegetable producer must evaluate the land selected, to decide if it is suitable for growing vegetables—and which ones.
 - The state Extension Service can assist with soil testing, site selection, and land preparation advice.
- Maximizing production while minimizing cost inputs are the major strategies in economical production.
 - Inputs include seed/seedlings, fertilizers, pesticides, water.
 - And the labor for all these, and harvest.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- *Seedbed* preparation is done just before planting the seeds of the crop.
 - The goal is to leave the soil level, with numerous pore spaces that will allow oxygen and water to enter freely.
- Leveling comes first & eliminates uneven drainage problems that can cause irregular field growth.
 - If the field is not leveled, there may be areas where water forms a pool after rain or irrigation.
 - Plants standing in water often have damaged roots because roots were deprived of oxygen while submerged.






COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

Many times the crops are grown on raised beds about 3 feet wide.

At this width, workers can access the plants for hand weeding and harvesting.

 **Figure 8-19** A machine for making raised beds for vegetables. Courtesy Sustainable Agricultural Machinery, Wodonga, Australia.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Whenever possible, a field is plowed when the moisture content is correct.
 - So it will have a fine surface texture through which seeds can germinate.
- Soil which has been producing crops for several seasons under irrigation & machine traffic may have developed a *hardpan*.
 - The hardpan must be broken up every few years by *chiseling* or *subsoiling*, or drainage will be poor.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- *Crusting* is damaging of the surface soil structure because the aggregation of the soil has been lost.
 - Caused by the impact of rain or irrigation water on soil with insufficient organic matter to sustain aggregation.
 - The surface becomes smooth, dry, and water repellent.
- Formation of soil crust is the main reason soil bed preparation is done immediately before planting.
 - It is difficult for seedlings to emerge after a crust forms.
- Organic mulch, such as chopped straw, can prevent crusting by breaking the force of water drops at the same time it holds moisture in the top layer of soil



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Most commercial vegetable seeding is done by machine, reducing labor costs in the planting stage.
 - Also later, because less hand thinning of seedlings will be needed for them to be at the optimum spacing for growth.
- Machines called *rotary tillers* deliver precise, slow, planting of seeds.
 - While, in some cases, shaping the seedbed, fertilizing, and applying herbicide.





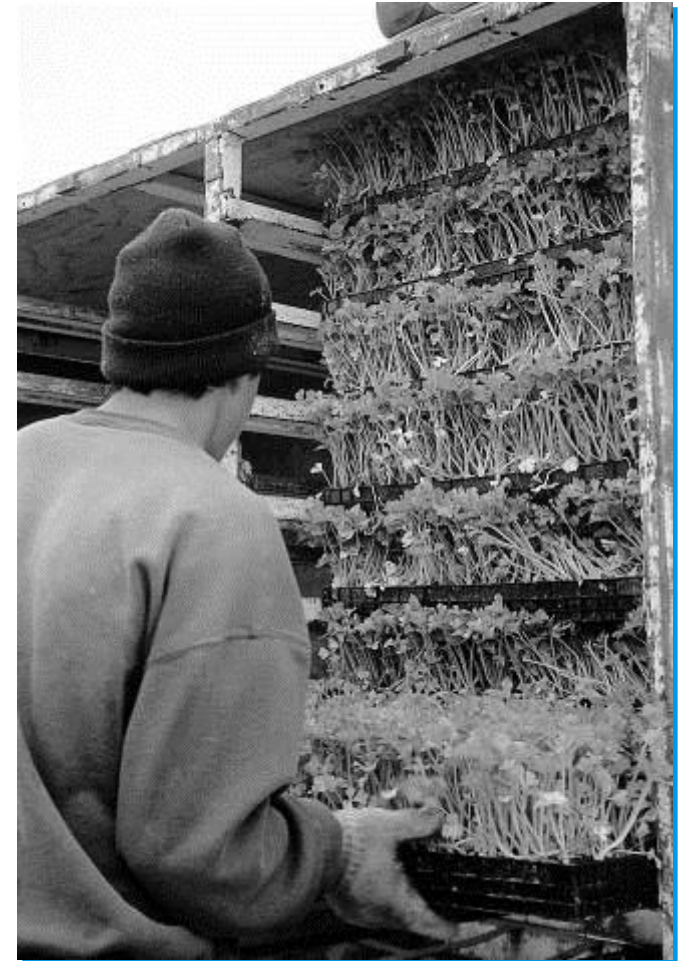
COMMERCIAL FIELD VEGETABLE PRODUCTION


Field Growing of Vegetable Crops

- Some vegetables are field grown, including broccoli, cauliflower, eggplants, & cabbage.
 - From seeded transplants.

Allows growers more control in germination/establishment stages of the crop.

Transplants can be grown under the best temperature & irrigation and not subjected to changes in weather as seedlings in the field



 **Figure 8-20** A worker loads plug flats of vegetable seedlings. Photo by the author.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Transplants can be put in the field by hand labor or by machine transplanters designed to water and fertilize the transplants at the time they are planted .



Figure 8-21 A commercial planter for vegetable seedlings. Courtesy Laanen Plant Systems.






COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Cultivation may be necessary to break soil crust.



 **Figure 8-22** A commercial vegetable weeder.
Sustainable Agriculture Machinery, Wodonga, Australia.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Irrigation is needed if natural rainfall is insufficient, as even slight *water stress* can reduce growth.
 - Without visible wilting.

A high salt content in soil can make a plant unable to absorb water from moist soil.

Green tissues may thicken but the plant will not wilt.

Quality will be reduced.



Figure 8-23 A boom system for irrigation passes over plug flats of vegetable seedlings. Author photo.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Sometimes plant roots are damaged by soggy soil.
 - In wet soil the roots are deprived of oxygen and die.
 - Dead roots cannot absorb water, and the end result is the same as a water deficiency due to drought.
- In the case of a simple water deficiency due to drought, wilting will be the first visible sign to occur.
 - The cells will lose *turgor*, the rigidity of a leaf that has the maximum amount of water it can contain.
- Leaves wilt, and eventually cell destruction occurs.
 - Before that happens, lack of water will cause the stomates to stay closed, and they do not absorb carbon dioxide.
 - Photosynthesis is reduced or stops, and growth stops.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- The grower must irrigate according to the type of root system the crop has: *shallow, medium, or deep.*

- The most critical period for water stress depends on the crop.

Table 8-4
VEGETABLE CROPS AND THEIR ROOTING DEPTHS

Rooting depth		
Shallow	Medium	Deep
cole crops	beans	asparagus
celery	peppers	watermelon
corn	summer squash	muskmelon
potatoes	cucumber	pumpkins
radishes	root crops other than onions	winter squash
onions and their relatives		sweet potato

- Foremost is initial establishment, flowering, and fruit enlargement.
 - With onions and radishes it is during bulb formation.
 - Cole crops can be stressed particularly during head formation.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Irrigation techniques depend on the area, finances, the crop, and many other factors.
 - High- or low-pressure sprinklers are most common.
 - Sprinkler pipes, once moved by hand in the field, now move on wheels down rows or pivot in a circle.
- For water conservation, probes, calibrated for soil type, measure water content 3 to 5 feet below the surface.
 - Precise soil-moisture measurement has led to documented water and energy savings of 10 to 20%.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Harvesting can be done by hand or by machine, or in some cases a combination.
 - Many vegetables for fresh market must be hand harvested to avoid damage.
- A “mule train” is a machine that follows workers down the rows as they harvest.
 - Lettuce or other crops are placed on a conveyor belt where it moves to a receiving unit for field packaging.
- Harvested by machine:
 - All potatoes, tomatoes & sweet potatoes to be processed.
 - Some peas and beans, most carrots, radishes & beets.
 - Also pickling cucumbers, some corn, and onions.



COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- *Post-harvest handling* is treatment of the crop after it leaves the field but before it is shipped for sale.
 - Washing, sometimes spraying with antidesiccant waxes to prevent wilting before sale, sorting & cooling.
- Removal of *field heat*, warmth in vegetables from the heat of the sun in the field is important.
 - Excess warmth must be removed so the vegetable will reach the correct storage temperature for maximum life.





COMMERCIAL FIELD VEGETABLE PRODUCTION

Field Growing of Vegetable Crops

- Cooling can be done by as *hydrocooling*.
 - Blocks of ice are floated in the vegetable wash water.
- *Vacuum cooling* happens in a refrigerated storage.
 - Cold air is pulled through the boxed vegetables, absorbing heat, quickly bringing them to proper storage temperature.
 - Humidity and ventilation are controlled and brought to an ideal level for storing the crop.





CULTURE OF COMMON GARDEN VEGETABLES

Asparagus

- **Asparagus (*Asparagus officinalis*)**
 - A perennial vegetable grown for its tender sprouts.
 - Also grown for tall, fernlike foliage/ornamental red berries.
- Sprouts appear in early spring in temperate climates.
 - Throughout the year in tropical areas.
- Sandy soils high in organic matter are best
 - If grown in loam or clay soils, crowns should be planted 5" to 6" deep—6 to 8" in lighter soils.
- Asparagus can be grown from either seed or 1- to 2-year-old crowns (preferable).
 - Seed won't produce an appreciable crop until the 3rd year.



CULTURE OF COMMON GARDEN VEGETABLES

Asparagus

- Selection of an asparagus cultivar should be based on the adaptability to local growing conditions.
- Normally asparagus is dioecious, and a cultivar is a mixture of male and female plants.
 - Female plants normally produce a lower yield, diverting a part of their energy instead to fruit and seed production.
- Recently *all-male cultivars* of asparagus have been developed and can be grown from seed.
 - Male plants flower, but don't fruit, so surplus carbohydrate can be stored, for additional yield in the form of spears.
 - 'Jersey Gem,' 'Jersey General,' 'Jersey King,' 'Greenwich.'



CULTURE OF COMMON GARDEN VEGETABLES

Asparagus

- Asparagus crowns should be planted 8 to 12 inches apart in rows in the spring or fall, with harvesting delayed until the 2nd year to allow establishment.
 - Watered regularly & use a balanced fertilizer.
- During the second year, spears should be harvested for a 2-week period, then allowed to leaf out.
 - In the 3rd year, spears may be harvested until plants show weakening, producing small-diameter spears.
 - Or ones that branch close to ground level.
 - Harvesting for too long a period, will weaken the crowns and cause a lower yield the following year.





CULTURE OF COMMON GARDEN VEGETABLES

Asparagus

- Asparagus spears should be harvested when they are 6 to 8 inches tall—before they begin to branch.

The best way to harvest is to snap the tips by hand

The shoots will break at the point where they become fibrous and inedible.



Figure 8-24 Picking asparagus by the snap method. Courtesy USDA.



- Refrigerate immediately after harvest, as quality diminishes rapidly in warm temperatures.
 - Flavor is retained best at high humidity, just above freezing.



CULTURE OF COMMON GARDEN VEGETABLES

Beans

- **Beans (*Phaseolus vulgaris*)**
 - Known as “snap beans,” “stringless” or “string beans,” “wax beans,” and “green beans.”
 - Beans may be either climbing vines called *pole types* or *runner beans*, or low-growing, bushlike plants called *bush* or *dwarf types*.
 - The edible pod is eaten while immature and should be picked before the seeds inside enlarge.
 - As quality declines rapidly after harvesting, beans should be refrigerated and kept in high humidity.
 - For best quality they should be eaten within 24 hours.





CULTURE OF COMMON GARDEN VEGETABLES

Beans

- Beans are warm-season annuals and will not tolerate cool temperatures or frost.
 - Plant only after weather has warmed in the spring.
- Any well-drained soil with a pH of between 6.5 and 7.0 is acceptable for growing beans.
 - Beans should be planted 1" deep and 2" to 3" apart.
 - They do not require thinning.
- If bush beans are grown, staking is not necessary.
 - Provide stakes for pole types, preferably at planting time.





CULTURE OF COMMON GARDEN VEGETABLES

Beans

- Beans should be sidedressed with a balanced fertilizer prior to flowering if leaves are not a dark-green color.
 - Summer irrigation is required in the South & South-west to prevent blossom drop, aggravated by hot, dry winds.
- Bush beans normally yield sooner than pole beans, but the harvest period will be shorter.
 - Succession plantings should be made 2 to 3 weeks apart to prolong the harvest.
- Though pole beans take longer to produce, they can bear until frost-killed, if all pods are kept picked.



CULTURE OF COMMON GARDEN VEGETABLES

Beets

- **Beets (*Beta vulgaris var.crassa*)**
 - Plants are only about 1 foot tall, with red-tinged leaves originating from a large red root.
 - Grows in all zones in summer, warmer zones in winter.
- While a light, well-drained soil with a pH above 6.5 is preferred, beets will grow in most garden soils.
 - Beets tolerate light freezes & should be planted as early as possible in spring & year-round in mild-winter areas.
- In most cultivars a “seed” contains several embryos, resulting in several plants at each location.
 - Thinning is necessary to space plants 2” apart.





CULTURE OF COMMON GARDEN VEGETABLES

Beets

- The root is the primary edible portion of the plant. and can be harvested and eaten at any time.
 - Quality is best before they reach 3" in diameter.
- Roots can be stored for 3 to 5 months in the coldest part of the refrigerator if tops have been removed.
- The leaves are more nutritious than the roots & can be harvested when plants are thinned or by picking individual leaves from the best plants.
 - No more than two leaves should be removed from a single plant, or root formation will be retarded.
 - If greens are desirable, delay thinning until several 3" to 4" leaves have formed.





CULTURE OF COMMON GARDEN VEGETABLES

Beets

- The tenderest beets are produced when plants are growing quickly, so a sidedressing of a balanced fertilizer is desirable 4 to 5 weeks after planting.
 - Irrigation should also be provided if rainfall is inadequate.
- When harvesting roots, pull beets starting when they reach 1" so more room is provided for those remaining.






CULTURE OF COMMON GARDEN VEGETABLES

Carrots

- **Carrots (*Daucus carota* var. *sativus*)**
 - An easy-to-grow, cool-season root crop for all climate zones.

The best quality carrots are produced in deep, loose soils with good drainage.

In heavy soils roots will often be crooked or forked short-rooted cultivars are likely to produce the best results in such soils.

 **Figure 8-25** Carrots deformed like these are caused by rocky, compacted soil and too much moisture. Courtesy of Stoke's Seeds, Inc., Buffalo, N.Y.





CULTURE OF COMMON GARDEN VEGETABLES

Carrots

- Seeds, small & slow to germinate, should be planted shallowly in soil well prepared, to eliminate clods.
 - Where crusting of the soil surface is a problem, organic matter should be mixed with the soil to cover the seeds.
- To aid emergence & mark where carrots are planted, radish seed can be mixed with carrot seed.
 - The radish seed will germinate rapidly, break the surface crust, and mark the location of the carrot row.
 - Radishes can be removed after the carrots germinate.
- If carrot leaves are a light green, a sidedressing with a balanced fertilizer will improve yield.
 - Fast growth will produce a more tender and tasty root.



CULTURE OF COMMON GARDEN VEGETABLES

Carrots

- Thinning can be done several times to ultimately leave 1-1/2" to 2", to provide adequate room for the roots to develop.
 - The last thinning can usually be delayed until the thinnings are pencil-size and can be eaten.
- Harvesting then can continue until carrots are 1" to 2" in diameter.
 - After harvest, refrigerate carrots in high humidity.
 - If fully mature, they will keep for 4 to 5 months.
 - Younger carrots can generally be stored only 4 - 6 weeks.





CULTURE OF COMMON GARDEN VEGETABLES

Chard

- **Chard (*Beta vulgaris* var. *cicla*)**

- Probably the easiest to grow and most useful leaf vegetable for the home garden.
- Actually a beet, but grown for its spinachlike leaves.
- Practically pest-free, highly recommended for a home garden.



- Leaves are harvested individually by cutting the outer ones off at the base as they reach edible size.
 - Chard will produce leaves year-round in mild areas and from early spring until late fall in colder areas.



CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops

- The term *cole crop* refers to several cool-season crops related to cabbage, having similar cultural requirements.
 - Broccoli, Brussels sprouts, cabbage, cauliflower, collards, kale, and several less common vegetables.
- All cole crops thrive under cool temperatures and will survive light frosts.
 - In hot-summer areas, grown as a spring or fall crop.
 - Where winters are warm, grown as a winter crop.
 - Collards alone are tolerant of very hot summer weather.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops

- Any well-drained soil is acceptable, with between pH 5.5 and 6.5 is ideal.
 - A wide range is satisfactory in practice.
- All cole crops germinate readily from seed planted 1/4" deep, or may be started from transplants.
 - Abundant moisture and a sidedressing with a high-nitrogen fertilizer are beneficial.
- The most serious problem with growing cole crops is the control of caterpillars and aphids.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Broccoli

- **Broccoli** (*Brassica oleracea*, Italica Group)
 - “Sprouting” cultivars that form a large number of small heads rather than one large head should be selected.

The edible part is the flower head, which should be harvested before the buds begin to open.

If all heads are kept picked, broccoli will continue to produce for many months.



Figure 8-27 The main head of this broccoli has been harvested, but it continues to produce edible side shoots.



CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Brussels Sprouts

- **Brussels Sprouts**
(*Brassica oleracea*, Gemmifera Group)
 - The edible parts are the small axillary buds that form along the main stem.
- As the plant grows taller, the lower leaves can be removed until leaves remain only at the top.
 - The plant will resemble a palm tree, with side growths looking like small cabbages.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Brussels Sprouts

- Sprouts should be harvested when about 1" across.
 - But before they begin to open.
- If the weather is warm, they will often be soft and leafy rather than hard.
 - Flavor & quality will improve as cool weather arrives in fall.
- For long storage, the entire plant should be pulled up in fall & replanted in damp sand in a cool cellar.
 - Sprouts will store for several months in this manner.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Cabbage

- **Cabbage (*Brassica oleracea*, Capitata Group)**
 - Cabbage should be harvested when the heads are hard.
- Because cabbage heads tend to mature at the same time, succession planting or use of several different cultivars with varying harvest dates is desirable.
 - If allowed to remain in the garden too long, the heads will split, especially after a heavy rain.
- Cabbage will store for 1 month or more under cold temperatures and high humidity.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Cauliflower

- **Cauliflower** (*Brassica oleracea*, Botrytis Group)
 - One of the more difficult cole crops to grow.
- For best results, plants should be kept growing vigorously by watering & fertilizing.
 - Any slowdown in growth will cause production of a small head of poor quality.
- Transplants that are not vigorous should be avoided.
 - These often produce a head only 1" or so in diameter, immediately after transplant.
 - A phenomenon called *bolting*.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Cauliflower

- Like broccoli, the edible parts of cauliflower are the immature flower buds.
 - The head is harvested while the buds are still pressed closely together—quality declines rapidly once buds begin to separate.

To produce white heads similar to those available in markets, the heads must be *blanched*.

This is accomplished by tying several of the upper leaves over the head as soon as it begins to form in order to shade it.



Figure 8-28 Blanching cauliflower. USDA.



CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Cauliflower

- Several self-blanching cultivars are also available.
 - These will cover the developing flower buds with leaves naturally, but only if the weather is cool.
- Failure to blanch cauliflower will result in heads light green in color.
 - Although more nutritious, they will have a stronger flavor.
- Cauliflower plants produce only one head and should be pulled out after the head is harvested.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Collards

- **Collards** (*Brassica oleracea*, Acephala Group)
 - This nonheading cabbage is tolerant of both very cold weather and the heat of summer.
 - As a result it is one of the most reliable plants for the production of greens.
 - Individual leaves can be harvested at any time.
 - During hot weather the flavor is likely to be strong.





CULTURE OF COMMON GARDEN VEGETABLES

Cole Crops - Kale

- **Kale (*Brassica oleracea*, Acephala Group)**
 - Another easy-to-grow plant for greens, less prone to insect problems than are other cole crops.
- Kale will not survive hot summers, but will often survive the coldest of winters, producing tender greens as soon as the snow melts.
 - To harvest, remove the outer leaves individually.





CULTURE OF COMMON GARDEN VEGETABLES

Corn

- **Sweet corn (*Zea mays* var. *saccharata*)**
 - One of the most popular home-garden vegetables.
 - A warm-season crop that should be planted only after danger of frost is past.
- Corn will thrive in a wide variety of well-drained soils, with a pH between 6.0 and 6.5 best.
 - It should be planted 1" to 2" deep & 8" to 10" apart.
 - Several short rows rather than one long row should be planned to ensure pollination.





CULTURE OF COMMON GARDEN VEGETABLES

Corn

- After corn has germinated, it is necessary to control weeds, provide water & give 1 or 2 sidedressings of high-nitrogen fertilizer.
 - As corn tends to reach harvesting stage all at one time, several succession plantings should be made.
 - The gardener can pick from midgets less than 3 feet tall to giants 6 to 7 feet tall.
 - Hundreds of cultivars of sweet corn are available.
 - Regardless of cultivar selected, popcorn or field corn should *not* be grown within 100 feet of sweet corn
 - To prevent cross-pollination and poor kernel quality.
-



CULTURE OF COMMON GARDEN VEGETABLES

Corn

- Corn is harvested when the silk (female flowers) on the ears turns dark brown and kernels are plump and filled with milky sap.
 - Because the sugar turns to starch quickly after picking, sweet corn should be cooked immediately after harvest.
 - With the exception of “super sweet” cultivars.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits

- Cucurbits includes many warm-season vine crops with similar growth requirements.
 - Cucumbers, squash, melons, and pumpkins.
 - In all cases the edible portion of the plant is the fruit.
 - Cucurbits require a warm climate for optimum growth and fruit development—the best quality of fruit is obtained when summers are long & hot.
 - Plantings should be made only after all frost danger is past & night temperatures are consistently above 45 deg F.
 - Melon cultivars should be selected carefully for adaptability to the local climate as they require the highest temperatures & longest growing season.
-



CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits

- Winter growing of cucurbits is restricted to the warmest areas of California, Florida, and Texas.
- Cucurbits can be started from seed sown 1/2" deep in late spring, or from transplants.
 - Seedlings should be purchased only if grown in peat pots or other plantable containers.
- Cucurbits can be planted in rows or hills.
 - If only a few plants are to be grown, the hill method is best because of better space utilization.
 - Vines can run along the ground or be trellised.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits

- Gardeners are often disappointed by the lack of fruit set early in the year on cucurbit plantings.
 - With most cultivars this is natural because cucurbits produce separate male and female flowers.
 - The normal pattern is for male flowers to be produced first, followed later by female flowers and corresponding fruit set.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Cucumbers

- **Cucumbers (*Cucumis sativus*)**
 - Compared to melons, cucumbers require a shorter growing season & less heat and are adapted to a wider range of climates.
- Two types of cucumbers—pickling cucumbers & slicers—are commonly grown in the home garden.
 - Pickling cucumbers are bred for their qualities as pickles and are harvested before they reach full size.
 - Slicers, bred for eating fresh, are larger & have thicker skins and a more attractive, less warty appearance.
 - They are harvested at full size but before seeds inside have developed tough seed coats.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Cucumbers

- Bitterness in cucumbers is due to including genetic composition, excessively warm temperatures, and lack of water.
 - Though bitterness is difficult to prevent, adequate water will decrease the chance of bitter cucumbers.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Melons

- The most commonly grown melons are:
 - **Cantaloupes (*Cucumis melo*, Reticulatus Group)**
 - More correctly, muskmelons.
 - **Watermelons (*Citrullus lanatus*)**
 - **Honeydew (*Cucumis melo*, Inodorus Group).**
- All require a long growing season, hot days, and plenty of moisture.
 - Honeydews need the most heat, followed by watermelons and muskmelons.
 - Cultivars are available that can be grown in most of the U.S. and Canada.





CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Melons

- Often one of the most difficult tasks the home melon grower faces is determining when the fruit is ripe.
 - Watermelons should be harvested when the stem of the melon has shriveled.
 - Muskmelons should be picked when the stem slips easily from the fruit with slight pressure from the thumb.
 - Honeydew melons are at their best when they develop a yellowish skin color and sweet smell.






CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Squash and Pumpkins

- **Squash and Pumpkins**
(*Cucurbita maxima*, *C. pepo*, *C. mixta*, *C. moschata*)
 - Easiest cucurbits to grow, producing an abundance of fruit.
 - Divided based on whether immature or mature fruit is eaten.



 **Figure 8-29** A selection of winter squashes in storage. Courtesy of National Garden Bureau.

Squash eaten when fruit is mature, possessing a hard skin are *winter squash*

The name is derived from the fact that these types ripen in late fall and can be stored in a cool place much of the winter.

Pumpkins are essentially a type of winter squash.




CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Squash and Pumpkins

- *Summer squash*, eaten while immature, include zucchini, yellow straight-neck & yellow crookneck
 - Perishable, they must be eaten soon after harvest.
 - Summer squash are picked before the skin begins to harden, but not necessarily when they are very small.
 - If large, they still are edible by scooping the seeds from the center prior to cooking.



 **Figure 8-30** Summer squash: *patty pan* on the left, *yellow crookneck* at bottom right, *zucchini* in the basket on the left, and *yellow straightneck* in the basket on the right.



CULTURE OF COMMON GARDEN VEGETABLES

Cucurbits - Squash and Pumpkins

- When selecting cultivars of squash and pumpkins, consider bush types instead of vine types.
 - They require much less room and produce the same quality of fruit.





CULTURE OF COMMON GARDEN VEGETABLES

Eggplant

- **Eggplant (*Solanum melongena* var. *esculentum*)**
 - A warm-season vegetable related to tomatoes & peppers.
 - Bushy plant, heart-shaped leaves, purple, star-shaped flowers.
- The edible portion is the egg-shaped fruit, generally large and purple in color, harvested when it has reached the size appropriate for the cultivar.
 - But before the skin has lost its natural sheen.
- Store eggplant at 50 to 55 deg F.
 - It can be damaged by storage in the refrigerator.





CULTURE OF COMMON GARDEN VEGETABLES

Eggplant

- Eggplants require a long period of warm weather to set and mature fruit properly.
 - In northern climates, plant early-maturing cultivars.
 - Grown from transplants as the plants are very slow to develop from seed.
- Starter fertilizer should be used at transplant, with a sidedressing of balanced fertilizer after first fruit set.
- Eggplants should be rotated in the garden to avoid being grown in the same area where related plants (tomatoes, peppers, potatoes) were planted.
 - Because they are subject to several soilborne diseases



CULTURE OF COMMON GARDEN VEGETABLES

Lettuce

- **Lettuce (*Lactuca sativa*)**


- A cool-season vegetable available in a number of types.

Those forming a firm head:
Head lettuce or iceberg.

Semiheading types:
Bibb and cos (romaine),

A type that produces
no head at all:
Leaf lettuce.



 **Figure 8-31** Four types of lettuce, clockwise from upper left: *head or iceberg* type, a *curly leaf* lettuce, *romaine or cos* type & *butterhead*.



CULTURE OF COMMON GARDEN VEGETABLES

Lettuce

- Heading/semiheading lettuce is harvested by cutting the head from the roots when it full grown and firm.
 - Leaf lettuce can be harvested by removing leaves individually or by cutting the plant at ground level.
- Head lettuce and romaine will keep 1 to 2 weeks in the coldest part of the refrigerator.
 - Leaf & *bibb* lettuce shouldn't be stored over 1 or 2 days.
- While lettuce will grow in most soils, emergence of seedlings in heavy soil may be hindered by crusting.
 - To remedy mix sieved organic matter into the soil used for covering the seeds.





CULTURE OF COMMON GARDEN VEGETABLES

Lettuce

- The crop requires cool temperatures and is best grown as either a spring or a fall crop.
 - A winter crop in mild-winter areas, if no hard freezes occur.
 - In hot weather, lettuce will become bitter & tend to bolt.
- Leaf and semiheading cultivars are generally seeded shallowly & later thinned to a 10-inch spacing.
 - Head and romaine lettuce may be seeded or transplanted.
- Transplants should be spaced at least 10" apart.
 - Thin seedlings to the same spacing as they begin to crowd.
 - If not thinned, lettuce will be prone to rot & may fail to head.



CULTURE OF COMMON GARDEN VEGETABLES

Lettuce

- Difficulty germinating may be due to overly warm soil—if suspected, place the seed in water in the refrigerator overnight prior to planting.
- Lettuce should be kept well watered & sidedressed with nitrogen-rich fertilizer once during its growing period.





CULTURE OF COMMON GARDEN VEGETABLES

Onions

- **Onions (*Allium cepa*)**
 - A popular, easy-to-grow vegetable crop, which grows best in a sandy soil rich in humus.
 - Heavy soil: add large amounts of organic matter before planting.
- Onions are classified as a cool-season crop but are tolerant of a wide temperature range, including frost.
 - Best-quality bulbs are produced when temperatures are cool early in the growing season & moisture is abundant.
- Onions can be grown from seed, transplants, or small bulbs called sets.





CULTURE OF COMMON GARDEN VEGETABLES

Onions

- Green onions (mistakenly called *shallots*) can be grown easily from seed.
 - Bulb types harvest earlier using sets/transplants.
- They may be planted 3" to 4" apart or closer together.
 - With every other plant pulled for use as a green onion.
- Regular watering & 1 or 2 sidedressings of balanced fertilizer during growing are recommended.





CULTURE OF COMMON GARDEN VEGETABLES

Onions

- Onions form bulbs only when the night is shorter than the critical photoperiod for that cultivar.
 - If the *critical photoperiod* is reached too soon after seeding, onions will bulb before the plants are large enough.
 - The resulting bulbs will be very small.
 - If it is *never* reached, the onions will *never* form bulbs.
- In areas where winter *and* summer crops are raised, a different cultivar must be selected for each season.
 - Because of the night length difference between seasons.





CULTURE OF COMMON GARDEN VEGETABLES

Onions

- Onions can be harvested at almost any stage of maturity, depending on the proposed use.
 - Young onions, regardless of cultivar, can be harvested before bulbing for use as green or bunching onions.
 - They are perishable and should be refrigerated.
- If mature onions with bulbs are desired, select a cultivar for storage characteristics should
 - The onions should remain in the garden until tops fall over.
 - After digging out, cut leaves off about 1" above the bulb.
- Bulbs should be dried outside, in slatted crates, or mesh bags in a warm indoor location.
 - After several weeks of drying, store in a cool, dark location.



CULTURE OF COMMON GARDEN VEGETABLES

Peas

- **Peas (*Pisum sativum*)**
 - A cool-season garden crop that shows a spectacular improvement in quality over purchased produce when home grown and picked immediately prior to eating.
- Peas require cool & abundant moisture, will tolerate moderate freezes but not heat.
 - Best grown as an early spring or late fall crop
 - In mild-winter areas, as a winter crop.
 - Where warm weather makes growing peas difficult, choose a heat-resistant cultivar such as 'Wando'.





CULTURE OF COMMON GARDEN VEGETABLES

Peas

- Pea seeds are sown about 1" apart & not thinned.
 - A common practice is to sow double rows about 8" apart.
 - And train two rows on a single string trellis.
- Supply water regularly to peas and pick pods as soon as they are mature to lengthen the harvest.
- Sidedressing a balanced fertilizer is recommended when the plants are 4" to 6" inches tall.
- The peas should be harvested when they begin to fill out the pod but before becoming tough.
 - Storage of peas is not recommended, but if unavoidable, they should be kept in the coolest part of the refrigerator.



CULTURE OF COMMON GARDEN VEGETABLES

Peppers

- **Peppers (*Capsicum annuum*)**
 - Sweet peppers or hot peppers, including bell, pimento, Mexican stuffing ('Anaheim'), and sweet banana types.
 - Hot peppers usually have fruits that taper to a point and can be green, red, or yellow.
 - Sweet peppers may be picked any time after the fruit has attained full size & color characteristic.
- *Bell peppers* not picked soon after reaching full size eventually will turn red
 - They are still edible & not hot, and some people prefer them at this stage because they are less bitter.



CULTURE OF COMMON GARDEN VEGETABLES

Peppers

- Hot peppers can be picked when full size & proper color have been reached or be allowed to dry on the plant for winter use.
- Picking the fruits as they ripen will increase total fruit production.
- Cross-pollination is commonly encountered by home gardeners raising both hot & sweet peppers.
 - Cultivars cross freely & while fruits each retain their proper taste, *seeds* will bear the characteristics of *both* parents.
 - Remove seeds of sweet peppers grown near hot peppers before eating.





CULTURE OF COMMON GARDEN VEGETABLES

Peppers

- Soil, climate requirements, and culture are the same as for eggplant.
- Poor fruit set is usually weather-related.
 - Excessively warm temperatures & cloudy, wet weather will prevent fruit set.
- Fresh peppers stored in the refrigerator will retain good quality there for 1 week or more.





CULTURE OF COMMON GARDEN VEGETABLES

Radishes

- **Radishes (*Raphanus sativus*)**
 - The fastest-growing garden vegetable & will produce a red, globe-shaped type edible root in 21 to 30 days.
- Chinese or icicle radishes, takes longer to mature, but produce larger roots that are white.
- Globe radishes are suitable for planting in the spring and become tough & pithy if not picked as soon as they reach edible size.





CULTURE OF COMMON GARDEN VEGETABLES


Radishes

- Icicle cultivars are preferred as a fall crop where the weather is warm.

Cool-season crops that grow best below 70 deg F.

Under warm temperature conditions, they tend to be hot and to bolt.



 **Figure 8-32** An icicle winter radish, also known as daikon.
Photo courtesy of W. Altee Burpee & Co., Warminster, Pa.

- Seed should be sown in early spring to avoid warm temperatures that slow growth and cause bolting.



CULTURE OF COMMON GARDEN VEGETABLES

Radishes

- Plants should be thinned to 1" apart soon after germination.
- Several sowings made 1 week apart are recommended to ensure a steady supply.
 - Radishes can be seeded along with carrots or leeks or between transplants of other crops because they mature quickly and can be harvested before crowding occurs.





CULTURE OF COMMON GARDEN VEGETABLES

Tomatoes

- **Tomatoes**
(*Solanum lycopersicum* or *Lycopersicon lycopersicum*)
 - The most popular of all garden vegetables.
- Actually herbaceous perennials, they are grown as annuals in the vegetable garden
 - Developing into branched bushes or vines with compound leaves and yellow flowers.
- Botanically related to eggplants & peppers, but easier to grow than either.
 - Fruit is most flavorful when ripened fully on the plant.
 - Green tomatoes can be eaten pickled or fried.





CULTURE OF COMMON GARDEN VEGETABLES

Tomatoes

- Tomatoes will succeed in a wide range of soil types, pH 6.0 - 6.8 is best, with adequate drainage.
 - They should *not* be planted in the same place year after year due to increased danger of wilt diseases and nematodes.
- Like peppers & eggplants, tomatoes are a warm-season crop.
 - For fruit to set, temperatures must be warm & pollen is not usually shed in night below 59 deg F.





CULTURE OF COMMON GARDEN VEGETABLES

Tomatoes

- In areas with cool summers or short frost-free growing seasons, select early cultivars.
 - They mature more quickly & grow better at cool temperatures.
- Cultivars that produce small fruits such as cherry tomatoes tolerate a wide range of temperatures.
- Tomatoes can be raised easily from seed planted directly in the garden, but usually raised from transplants for an earlier harvest.





CULTURE OF COMMON GARDEN VEGETABLES

Tomatoes

- Spacing of the plants will depend on whether the cultivar to be grown is *determinate* or *indeterminate*.
 - Determinate cultivars grow into bushy plants that can be staked, caged, or allowed to sprawl along the ground.
 - Indeterminate types grow long & vinelike, and definitely require support.
- Apply a balanced fertilizer prior to planting and a nitrogen sidedressing 1 month later.
 - After which nitrogen applications should be restricted.
 - When planting tomatoes from transplants, a starter fertilizer is beneficial.





CULTURE OF COMMON GARDEN VEGETABLES

Tomatoes

- Although pruning is sometime advocated for home-grown tomatoes, most experts now agree pruning slows fruit production, and increases fruit sun scald.
 - Fruit will be bleached on one side where is is most exposed to the sun.





CULTURE OF COMMON GARDEN VEGETABLES

Turnips

- **Turnips (*Brassica rapa*)**
 - A cool-season root crop related to cole crops.
- While the root is the primary edible portion, the leaves are also edible.
 - Some cultivars are grown mainly for their leaves.
- Turnip leaves do not store well and should be picked immediately prior to eating.
- Roots store for long periods if the tops are removed they are kept in a cool, humid environment.
 - They should be harvested when 2" to 3" in diameter.





CULTURE OF COMMON GARDEN VEGETABLES

Turnips

- Turnips grow best in a light- to medium-weight soil rich in organic matter.
 - They produce large crops in almost any well drained soil.
- They are grown from seed that germinates rapidly in the garden, as a spring or fall crop in most areas.
 - In hot summers locales, fall plantings are most successful.
- Plants grow rapidly, with tender roots, if watered well & sidedressed lightly with a balanced fertilizer.
- Young plants grow vigorously and will need to be thinned to about 3" apart when they are 3" tall.
 - Thinning is not required if they are grown for greens only.

Artichokes

- Two very different plants are called artichokes.
 - The globe artichoke (*Cynara scolymus*) is a tender perennial generally grown only in areas where the ground does not freeze.
 - The Jerusalem artichoke (*Helianthus tuberosus*) is a hardy perennial grown throughout the U.S. and Canada.




MINOR VEGETABLES

Artichokes - Globe

- **Globe Artichoke (*Cynara scolymus*)**
 - A large, thistlelike plant up to 6 feet in diameter.

The large flower buds it produces in late spring and early summer are the edible portion of the plant.

Artichokes keep 2 to 3 weeks in the coldest part of the refrigerator in a plastic bag.

 **Figure 8-33** A field of globe artichokes.
Photo courtesy of USDA.



Artichokes - Globe

- The globe artichoke grows best in areas where winter temperatures are mild and summers are cool.
 - California's coast, where summer fog is common, is ideal.
 - In most areas late winter/early spring is the best time to plant.
 - In hot-summer regions, artichokes often produce buds that open rapidly and have a leathery texture.
 - In zones 1 - 7, artichokes can be grown in containers in summer and moved indoors in the winter.
 - Or they can be dug after cold has killed the leaves and the crowns stored in damp sawdust until spring.
 - A heavy mulch generally provides sufficient protection in zones 8 and 9 to overwinter the crowns.



Artichokes - Globe

- Artichokes are usually grown from divisions that consist of a woody stalk, a root, and leaves.
 - This division should be planted vertically, with the base of the leaves slightly below the soil surface.
 - Allow 3 to 4 feet (1 to 1.2 meters) between plants.
- A starter fertilizer is beneficial at planting, and after plants begin to grow, plenty of water and nitrogen fertilizer should be provided.
 - In cold-weather regions, nitrogen fertilizer should be withheld after midsummer to enhance cold tolerance.



Artichokes - Globe

- When buds appear, harvest before they begin to open by cutting the stem 1/2" to 1" below the base.
 - After buds are cut, the supporting stem will shrivel and then should be cut back to healthy growth.
 - New shoots sprout from the base to provide next year's harvest.



Artichokes - Jerusalem

- **Jerusalem Artichoke (*Helianthus tuberosus*)**
 - A sunflower with coarse, hairy leaves that grows to a height of 6 feet.
 - Edible portions of the plant are underground tubers that are produced abundantly in the fall.
- The tubers are harvested after frost or may be left in the ground all winter and dug as needed.
 - After harvest, the tubers can be stored 2 to 5 months under high humidity, as close as possible to freezing.
- The Jerusalem artichoke grows in zones 2 - 9.
 - Best quality & highest yields occur in the colder zones.

Artichokes - Jerusalem

- Highest yields are obtained any well-drained soil with poor nitrogen content.
 - They may be grown in the poorest section of the garden.
 - Plants are very vigorous and generally do not require any fertilization or care until harvest.
- Propagation is from tubers purchased at nurseries or seed companies or grocery produce department.
 - Planted 3" to 5" deep, 5" to 10" apart, in spring.
- When harvesting, remove all tubers except a few to start the next season's crop—if many tubers are left, the plant may become a weed problem.

Black-Eyed Peas

- **Black-eyed peas or cowpeas**
(*Vigna unguiculata* or *V. sinensis*)
 - A warm-season.
- Seed 2" to 4" apart in rows 6 feet apart in slightly acidic soil.
 - Plants are bean-like, erect & normally don't need training.
- Harvest when pods, normally 3" to 8" long, are slightly yellow, but before the seeds inside are dry.
- Some *V. s. sesquipedalis*, or cowpea, are vining, require support, & produce yard-long pods.

Celery

- **Celery (*Apium graveolens*)**
 - One of the most difficult vegetables for a home garden.
- Prefers soil rich in organic matter & requires a long growing season with temperatures 65 to 70 deg F.
 - Approximately 5-months from seeding to harvest.
- In prolonged periods below 50 deg F occur, it will bolt before leaf and stalk development take place.
 - If temperatures are too warm, it will become tough.
- Celery is generally grown from transplants 3" to 4" tall planted 10" apart.
 - Seeds require 3 weeks to germinate and another month to reach transplanting size.



MINOR VEGETABLES

Celery

- Blanching, a common practice in the past excludes light from stalks & decreases chlorophyll content.
 - Accomplished by mounding soil around lower stalks or otherwise shading them.
- Most gardeners today do not blanch celery because it results in a lower nutritional value.
 - Many cultivars are “self-blanching.”
- Harvested by cutting the plant at ground level or by removing individual stalks as needed.
 - Celery will keep for several weeks if refrigerated and kept in a humid condition.



MINOR VEGETABLES

Chinese Cabbage


- **Chinese cabbage, celery cabbage**
(*Brassica rapa*, *Pekinensis* Group)

Fast-growing, cool-season annual leaf vegetable which is prized for Chinese dishes.

Several distinct types, varying in leaf shape are grown.

- Sown early in spring or as fall approaches to avoid hot weather and flowering.
- Thin to 8" apart if crowded.
 - Heads are harvested individually later.



 **Figure 8-34** Chinese cabbage of the Napa type.
Courtesy W. Altee Burpee & Co., Warminster, Pa.

MINOR VEGETABLES

Kohlrabi

- **Kohlrabi**
(*Brassica oleracea*, Gongylodes Group)
 - A relative of cabbage grown for its enlarged stem.



 **Figure 8-35** Kohlrabi ‘Grand Duke.’
Courtesy W. Altee Burpee & Co.


- Plants are harvested when the enlarged portion is 2” to 4” in diameter—see “Cole Crops” for cultural data.

MINOR VEGETABLES

Leeks

- **Leeks (*Allium ampeloprasum*)**
 - A nonbulbing relative of the onion with a mild flavor.
- Generally grown from seed, and requires a long, cool growing season.
- Soil can be mounded around the plants to blanch more of the stem, to produce more edible portion per plant.
 - The white underground stem is eaten at any size.



 **Figure 8-36** Leeks. Courtesy USDA.

Mustard

- **Mustard (*Brassica juncea*)**
 - A fast-growing, cool-season vegetable grown for its strong-flavored greens.
- Seeded directly in the garden in early spring.
 - Individual leaves are picked when at 3" to 4".
- Planting early is important because mustard will flower & die as soon as the weather becomes warm.




Okra

- **Okra (*Abelmoschus esculentus*)**
 - A large, fast-growing plant producing edible seed pods.

To grow well, okra requires hot weather, well-drained soil, and a relatively long growing season.

Pods should be picked before they reach 3" in length.

 **Figure 8-37** Okra with flower.
Photo courtesy Steve Goldthorp.



MINOR VEGETABLES

Parsnips

- **Parsnips (*Pastinaca sativa*)**

- White, carrot-shaped roots with a sweet, nutlike flavor.



- Grown like carrots, they are cool-season vegetables.

- Seed in deeply worked soil very early in spring.

- Roots can be harvested at any size & can remain in the ground for winter and spring eating.

- Among the shortest-lived of all vegetable seeds.

- Do not store old seed.

 **Figure 8-38** Parsnips.

Potatoes

- **Potatoes (*Solanum tuberosum*)**
 - Grown for their underground tubers, in most climate zones.
 - Quality will be best in a climate with cool nights.
- Generally grown from seed potatoes, small pieces of a potato with at least one eye or bud per section.
 - Only certified seed potatoes, guaranteed to be disease-free should be grown.
- A cultivar that can be grown from seed started in flats about 8 weeks prior to transplanting is available.



Potatoes

- New potatoes are small, thin-skinned, immature potatoes harvested when plants begin to flower.
 - They should be eaten immediately after digging in summer.
- To store potatoes for winter use, delay harvest until the tops of the plants have died in fall.
- Unless a large garden space is available, potatoes are not considered worth raising in the home garden.
 - Quality will not differ substantially from supermarket potatoes, and monetary savings are usually minimal.
 - Home-grown potatoes require careful attention to control insects and diseases.



Rhubarb

- **Rhubarb (*Rheum rhabarbarum*)**
 - A perennial, grown in all USDA zones, for its leaf stalks, which have an acidic, fruitlike flavor.
 - Leaves contain oxalic acid and are poisonous.
- One- or two-year-old crowns should be planted in spring and light harvesting started the following spring by removing one or two leaves per plant.
 - Flower stalks should be removed as soon as they appear to divert the strength of the plant into vegetative growth.
- Fertilizing once or twice per year is sufficient, and clumps should be divided about once every 4 years.

Rutabagas

- **Rutabagas**
(*Brassica napus*, Napobrassica Group)
 - Grown for their large turniplike roots, which have a flavor similar to that of a strong turnip.
 - Their culture is the same as for turnips.



Salad Greens

- Alternative salad greens have recently become popular in restaurants & salad mixes sold in the supermarket as *mesclun*.
 - Very easy to raise from seed in about a month.
- Young leaves of spinach, beets greens, kale, Swiss chard & Chinese cabbage can be used in salad.
 - Some colored-leaf cultivars of these vegetables are specifically sold for growing as salad greens.
 - Seed mixes of several salad greens or a mix of salad greens and colored lettuces are available.



Salad Greens

- Plant about 5-foot rows of salad greens each week through spring, & in fall after weather begins to cool.
 - In warm weather they flower, and the flowers can be harvested for eating and the plants removed.
- Harvest individual leaves by cutting the top 2" to 3" of growth with scissors when plants are 4" to 5" tall
 - Allow to regrow for more harvests.
- Alternatively, harvest whole plants when about 3" tall by cutting them at ground level.
 - Handle the leaves carefully to avoid bruising them.



Salad Greens

- **Arugula, Rocket or Rockette**
(*Eruca vesicaria* ssp. *sativa*)
 - Slightly bitter, tangy taste; Not adapted to heat, shade partially in hot weather.
- **Chervil or French Parsley**
(*Anthriscus cerefolium*).
 - Related to parsley but has a licorice flavor & thrives in cool weather, flowering once the weather becomes warm.



Salad Greens

- **Cress, Upland Cress, Curly Cress, Land Cress (Lepidium sativum or Barbarea verna).**
 - Not the same as water cress, which grows in streams.
 - Several plants are sold under this general name, and have the same peppery taste.



MINOR VEGETABLES

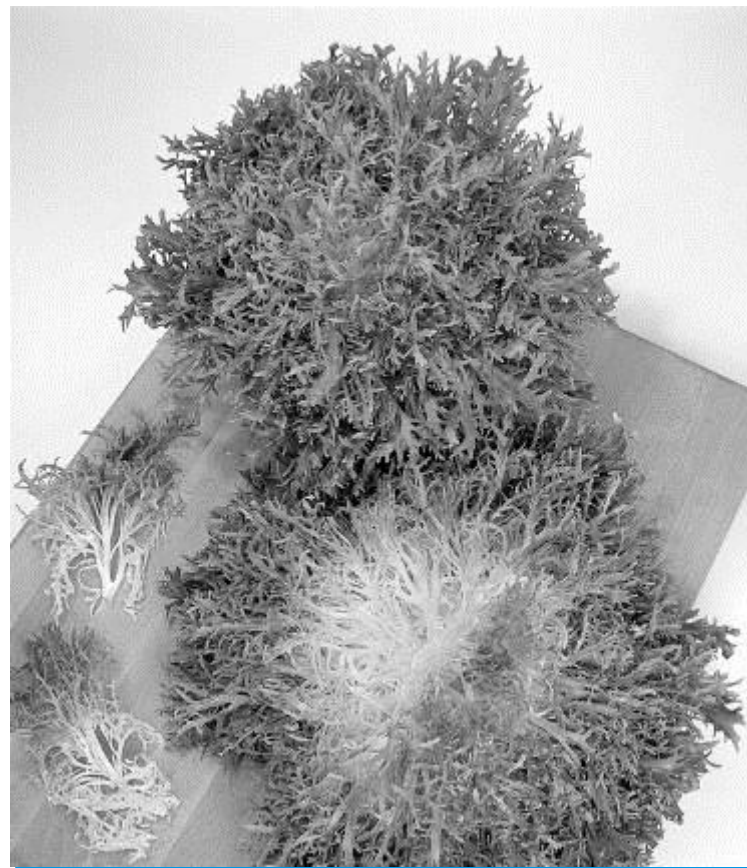
Salad Greens

- **Endive (*Cichorium endive*)**
Chicory (*Chicorium intybus*)

- Endive, also known as curly endive, frisee, or escarole, and chicory are related plants with a slightly bitter taste.

If curly endive is allowed to grow to maturity the outer leaves can be tied over the inner ones to blanch them.

 **Figure 8-39** Curly endive.
Courtesy W. Altee Burpee & Co.



Salad Greens

- Endive (*Cichorium endive*)
Chicory (*Chicorium intybus*)
 - Also known as red chicory and witloof blanched chicory.
- One type is white with a rocket-shaped, tight head.
 - The second type is white and red and can be either rocket-shaped or have cabbage-shaped head.
 - Home gardeners usually prefer to eat it before it matures to head size.



Salad Greens

- **Mâche, Lamb's Lettuce, or Corn Salad (*Valerianella locusta*)**
 - Bright green plant with small leaves about 1/2" across.
- The taste is similar but a little stronger than lettuce.
 - Plants are generally harvested whole.
- **Water Cress (*Nasturtium officinale*)**
 - Grows wild in many streams but can also be cultivated in the garden in moist neutral pH soil and full sun in spring.




MINOR VEGETABLES


Snow Peas, Chinese Pea Pods, Edible-Podded Peas

- **Snow Peas, Chinese Pea Pods, Edible-Podded Peas**
(*Pisum sativum* var. *macrocarpon*)
 - Culture the same as for peas.



 **Figure 8-41** 'Sugar Snap'
variety of edible pod pea.



 **Figure 8-40** Snow pea
or Chinese pea pod.





MINOR VEGETABLES

Spinach

- **Spinach (*Spinacia oleracea*)**
 - A nutritious, cool-season vegetable grown for its strongly flavored leaves.
- Seed in early spring directly in the garden.
 - Harvested before hot weather as the plants will flower.



Sweet Potatoes

- **Sweet potatoes (*Ipomoea batatus*)**
 - Can be grown in warm climates with a frost-free growing period of 120 days or longer.
- Grown from transplants spaced 24" to 30" apart.
 - Can be harvested as soon as they reach edible size.
- If plans include storage for winter use, harvest should be delayed until frost kills the tops.
 - Roots are cured at 85 deg for 3 weeks, stored at 55 deg F.
- Care should be taken that roots are not bruised and curing is performed properly.
 - Else potatoes will not store well.





*8

Vegetable Gardening



**END OF
CHAPTER**