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Home Vegetable Garden  
Michigan State University  
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# Home Vegetable Gardening

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# Home Vegetable Garden

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Your vegetable garden is a source of food and enjoyment. No one is likely to eat better than the home gardener who has a well-planned and cared-for garden. Not only can the home gardener have fresher vegetables than he can buy, he can grow high-quality varieties that seldom can be purchased.

A garden also provides wholesome recreation for the city or suburban family. Working in a garden can be very relaxing after a long day at the office. Gardening can be as simple or as complicated as you care to make it. It can be a very rewarding hobby with only a small investment.

## Locating the Garden

The success of the garden depends greatly on location. Even though you are probably limited in choice of location, you should consider the following factors:

**Good Soil**—A loose, fertile, level, well-drained soil is best.

**Sunlight**—Sunlight is necessary to produce high-quality vegetables. Do not plant near buildings, trees, or shrubs that may shade your garden.

**Other Plants**—Avoid a location near trees and shrubs because they compete with the garden crops for soil moisture and plant food.

**Water Supply**—Where possible, have a water supply near your garden site.

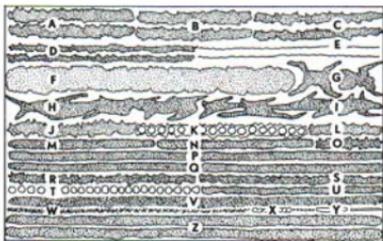
**Convenience**—Your garden should be near your house where you can work in it when you have a few minutes.

## Planning the Garden

After choosing a garden site, the next step is to plan the arrangement of crops in the garden. Consider each of the points listed below. Then plan your garden on paper.

**Size**—The size of your garden depends on the space available, the quantity of vegetables you will need, the kind of vegetables, and the amount of work and time you plan to devote to the garden. Make the garden just large enough so that it will be interesting and enjoyable, but not so large that it will become a burden and not receive proper care.

### Sample Plan for a Large Garden (50' x 80')



This plan allows for earlier plantings to be made from both sides of the garden, with later plantings toward the middle. **Key:** (A) Sweet corn — early variety, (B) Sweet corn — mid-season variety, (C) Sweet corn — late variety — main crop (A, B and C are all first plantings), (D) Sweet corn — later planting of main crop, (E) Sweet corn — last planting of main crop, (F) Summer squash, bush type winter squash and/or bush type pumpkins, (G) Cucumbers, (H) Muskmelons, (I) Watermelons, (J) Tomatoes — early variety, (K) Caged tomatoes — main crop, (L) Cherry tomatoes, (M) Eggplant, (N) Peppers, (O) Swiss Chard, (P) Lima beans, (Q) Snap beans, (R) Parsnips, (S) Beets, (T) Cabbage, (U) Broccoli, (V) Carrots, (W) Onions, (X) Bibb type lettuce — early and later plantings, (Y) Leaf lettuce — early and later plantings, (Z) Peas.

**Kinds of Vegetables**—The vegetables you choose should be those you and your family enjoy. If your garden plot is small, grow mainly those crops with a home garden "freshness" not generally found in stores. These include: asparagus, beans, broccoli, leaf lettuce, peas, radishes, spinach, sweet corn and tomatoes.

Because certain vegetables take up so much space, they should seldom be planted in small gardens (25 feet or smaller). These include: cucumbers, melons, potatoes and squash (vine type). If only a very small area is available for a garden, grow crops that are especially productive, such as snap beans, tomatoes, summer squash, pepper, etc. In addition, you may want to stake or cage tomato plants to conserve space, which also reduces the amount of ground rot on the fruit. Beans can also be grown on poles to conserve space.

**Amounts**—The amounts of each vegetable to grow will depend upon the needs and desires of your family.

**Growth Characteristics**—The various vegetables should be grouped in your garden according to their growing season requirements and growth characteristics. Plant perennial crops, such as asparagus and rhubarb, along one side of the garden so that they will be out of the way when you spade or plow. Group early planted crops at one end of the garden so that you can spade or plow

your garden as you plant. Wherever possible, plant tall growing crops to the north or west of lower growing crops to avoid shading.

**Spacing Between Rows**—Proper spacing between rows is important to allow for growth of plants, ease of cultivation, and efficient use of space. Recommended spacings are given in the Planting Chart at the end of the bulletin. Allow enough space between rows for convenient cultivation with the available tools.

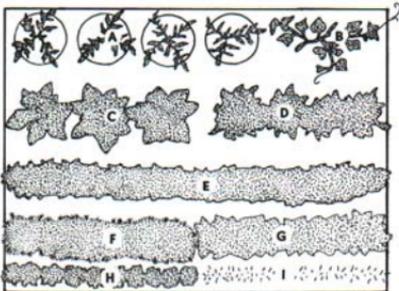
**Successive Plantings**—Plan for continuous harvest through successive plantings. Three or four small plantings of corn, beans, and lettuce, for example, will be better than a single large planting. It is also important to use early, mid-season and late-maturing varieties in conjunction with successive plantings to insure a continuous harvest.

**Crop Rotation**—Rotate crops from year to year to prevent common plant diseases that overwinter in the soil. Rotate crops from one side of the garden to the other.

**Erosion**—If your garden is on a hill, plant the rows across the slope rather than up and down. A winter cover crop also helps to reduce erosion.

**Cross-pollination**—Gardeners need not be concerned about "crossing" between crops if they do not save their own seed. It is true that many closely related vegetables will cross-pollinate (e.g., summer squash with winter squash and pumpkins, water melons with citron etc.). But the effect is only on the seed and not the fruit. Thus, you can safely plant melons beside cucumbers, red tomatoes next to yellow ones; in fact vegetables may be mixed in every possible combination without influencing the **edible portion** produced the same season. The single exception is sweet corn — pollen from popcorn, field corn, or other sweet corn varieties will influence the color, shape and flavor of the kernels.

### Sample Plan for a Small Garden (11' x 16')



**Key:** (A) Caged tomatoes, (B) Cucumber, (C) Eggplant, (D) Peppers, (E) Snap beans, (F) Carrots, (G) Beets, (H) Lettuce, (I) Onions.

## Vegetable Varieties and Sources

Most of the vegetable varieties released each year will yield better and have higher quality than older varieties. However, excellent older or standard varieties should not be discarded just because newer ones are available. Try out a few varieties each year to see how they perform before discarding proven varieties. All-American varieties are selected each year and are usually listed in seed company catalogs. You may wish to try some of these.

Experienced gardeners buy most of their seeds through seed catalogs because many more varieties are offered for sale, especially the newer ones. Catalogs of most seed companies are available from December through spring and include much information that cannot be printed on small packets, such as varieties recommended for home freezing, disease-resistant varieties, hybrid varieties, etc. Names and addresses of seed companies can be obtained from garden magazines. For additional information on varieties, write for Extension Bulletin E-760, "Variety and Pesticide Recommendations for the Home Vegetable Garden", from MSU Bulletin Office, P. O. Box 231, East Lansing, Michigan 48823.

## Soils and Fertilizers

Soils which contain a good supply of organic matter are more easily tilled, more productive and hold more water than soils containing little organic matter. Well-rotted manure, compost, shredded peat, and sewer sludge are common sources of organic matter. Planting green manure crops (such as rye in late August and plowing down with 1 lb. of actual N/1,000 sq. ft. in the spring) is another way of adding organic matter. Well-rotted barnyard or stable manure is the best source of organic matter for gardens. For best results, spread at the rate of  $\frac{1}{2}$  ton/1,000 sq. ft. before the soil is plowed or spaded, either in the fall or spring. When using this amount of manure, reduce the amount of commercial fertilizer recommended by one-half. Apply a complete fertilizer such as 5-20-20 (20 lb./1,000 sq. ft.) before planting and add supplemental nitrogen (1 lb. of actual N/1,000 sq. ft.) around July 4th. Ammonium nitrate (33% N) and urea (46% N) are most commonly used to provide supplemental nitrogen. Three pounds of ammonium nitrate or 2 lbs. of urea are required to provide 1 lb. of actual N/1,000 sq. ft. Place the fertilizer in a band about 4 inches to the side of plants (commonly referred to as *sidedressing*\*) or in a ring about 4 inches away from individual plants, like

\* Sidedressing: applying fertilizer in a band along one side of a row about 4 inches from the crop.

tomatoes, or broadcast between the rows. Work the fertilizer into the soil for best results.

Commercial fertilizers are labeled to show the content of nitrogen, available phosphate and water soluble potash. A 5-20-20 fertilizer contains 5% nitrogen, 20% available phosphate and 20% water-soluble potash, in that sequence. Therefore, in 100 pounds of a 5-20-20 fertilizer, there would be 5 pounds of nitrogen, 20 pounds of available phosphorus, and 20 pounds of water-soluble potash.

It is quite easy to determine how much fertilizer to apply to a specific area. For example, if you need to apply a 5-20-20 fertilizer at the recommended rate of 20 lbs. per 1,000 sq. ft. over your garden, which measures 60 ft. x 80 ft., first calculate total square feet (60 ft. by 80 ft. = 4,800 sq. ft.). Divide total square feet by 1,000 (4,800  $\div$  1,000 = 4.8) and multiply by 20 (4.8 x 20 lbs. = 96.0 lbs.). Thus, 96 lbs. of 5-20-20 would be needed to fertilize 4,800 sq. ft. at the recommended rate of 20 lbs. per 1,000 sq. ft.

Rates for supplemental nitrogen are usually given as the number of pounds of *actual* nitrogen per 1,000 sq. ft. Therefore, if you need to apply 1 lb. of actual nitrogen/1,000 sq. ft. to an area 60 ft. by 80 ft., determine the area as before (60 ft. x 80 ft. = 4,800 sq. ft.), divide that area by 1,000 (4800  $\div$  1,000 = 4.8 thousand sq. ft.) Then, multiply the number of thousand square feet by 3 if using ammonium nitrate fertilizer (33% N), or by 2 if using urea (46%N) to determine the pounds of fertilizer needed. You would, therefore, need almost 15 pounds of ammonium nitrate (4.8 x 3 = 14.4 lbs.) or almost 10 pounds of urea (4.8 x 2 = 9.6 lbs.).

## Starter Solutions

Starter solutions may have a pronounced influence on early growth and yields, regardless of other fertilizer treatment or natural soil productivity because they help to promote good root growth. Available fertilizer, particularly phosphorus close to the root systems of newly-set plants, is very important. A typical analysis of a starter solution fertilizer is 10-55-10. Follow the directions on the container.

## Composting

**Materials Used**—Compost is an artificial or synthetic manure prepared by fermenting or decomposing such materials as grass clippings, leaves, sod, straw, vegetable refuse, manure, mushroom soil, corn stalks, asparagus stems, sunflower heads, weeds and other easily decomposable plant material. The odor of a compost pile is sometimes objectionable, so select a site near the back of a lot and away from neighbors.

**Recommended Procedure**—Compost can be prepared in any quantity using the following method:

1. Spread a portion of materials to be composted in a layer 6 to 8 inches thick.
2. Sprinkle this layer with a small amount of complete commercial fertilizer, such as 5-20-20 or 6-12-12 (3 cups per bushel of compost) or mix in some animal manure. Adding small amounts of dolomitic limestone (2/3 cup per bushel of compost) will counteract excessive acidity and hasten decomposition.
3. Wet the layer thoroughly, but not enough to wash the fertilizer away.
4. Add a small amount of fertile soil to each layer to hasten bacterial action and decomposition and reduce odor.
5. Form additional layers 6 to 8 inches thick on top of the first one until all material is in the pile. (Repeat Step 2.)
6. Add additional layers on top as new material becomes available.
7. Keep the pile moist.
8. The length of time for decomposing materials varies from 6 weeks to 6 months or more.
9. The rate of decomposition can be hastened by turning the pile over 2 or 3 times at 2-week intervals. Turning also reduces odors.

#### **Simplified Procedure**

1. Place material to be composted in a pile, preferably adding small amounts of commercial fertilizer or animal manure as the pile is built up.
2. Turn over and water occasionally.
3. Use when decomposed.
4. This method may require two or more years before complete decomposition occurs.

## **Planting Dates**

Most gardeners should attempt to make several different plantings in their garden instead of only 1 large planting after the danger of frost is over. This will allow you to garden a little at a time without having to do all of the planting in one day.

How early you can plant depends on the hardiness of the vegetables and the climate in your area. Certain vegetables can withstand frost while others cannot. The Planting Chart at the end of the bulletin lists the planting times for all vegetables.

Most vegetables can be divided into 2 groups: those that grow best in cool weather and those that grow best during warm weather.

Examples of cool season vegetables include: beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, kale, kohlrabi, lettuce, onion, peas, radishes, spinach.

Examples of warm season vegetables include: beans, corn, cucumbers, eggplant, melons, okra, peppers, pumpkins, squash, tomatoes.



**Compost pile showing layers of plant material and fertilizer.**

In general, cool season vegetables are hardy or frost tolerant and grow best during cool weather. Therefore, cool season vegetables should be planted as early as possible in the spring for an early summer crop or planted in late June for a fall crop. Most cool season vegetables will not tolerate hot weather.

Warm season vegetables are not hardy or frost tolerant, are subject to chilling injury, the seeds do not germinate well at low temperatures, and the plants grow best during warm weather. Therefore, warm season vegetables should be planted after the danger of frost in the spring. Some vegetables, such as sweet corn, can be grown earlier but may be injured by frost. Tomatoes may be planted before the last frost if protected with hot caps or hot tents.

## **Sowing Seeds**

Plant in a freshly prepared seedbed; otherwise, weeds are likely to come up before the plants. Keep the ground worked where late sowings are to be made to prevent weeds from starting.

Some simple steps for sowing seeds are given below:

1. Plant in straight rows. This will add to the eye appeal of your garden and make cultivations, insect control, and harvesting easier. To mark a row, drive 2 stakes into the ground at each end of the garden and draw a string taut between them.

2. Mark the rows. Shallow furrows suitable for small seeds can be made by drawing a hoe handle along the strip.

3. Either sow the seeds in hills or space them evenly in the row (drilling). Squash, melons and cucumbers are commonly planted in hills at definite intervals in the row.

4. Space seeds properly in the row. The number of seeds to sow per foot is usually listed on the seed packet.

## Thinning

Thinning the seedlings in the row is one of the most important garden operations. It is difficult, and unwise, to sow small seeds far enough apart to permit the plants to make their best development. The Planting Chart gives the proper plant spacing in the row after thinning.

Thin white plants are small and when the soil is moist, so pulling does not injure those that are left. Thin turnips, rutabagas and other root crops before their taproots become fleshy. Onions from seeds and radishes can be left in the ground until those to be thinned are large enough to be eaten.

## Transplanting

You can plant the seeds of most vegetables directly into your garden and they will be ready for harvest before frost. However, you will want to hasten tomatoes, peppers, cabbage, cauliflower, broccoli and perhaps other vegetables by transplanting small plants into the garden. You can usually buy better quality transplants than you can grow yourself. The main advantage of producing your own is that you can grow the variety you want. If you grow your own, start them indoors and harden prior to placing outdoors to grow.

Hardening is accomplished by withholding water, lowering the temperature and placing the plants outdoors in a protected area during warm days and bringing in at night. Most plants will harden sufficiently in 2 to 3 weeks. Hardening should begin near the date of the last freeze which is usually 2 or 3 weeks earlier than the frost-free date in spring. After the weather has warmed and the danger of frost has passed, the plants should be placed in a well-lighted outdoor location.

A little extra effort in transplanting vegetable plants will be repaid. Follow these steps:

1. Water the plants thoroughly. This will make the soil cling to the roots.
2. If the plants are growing in flats or trays, "block" them out by cutting the soil between the plants with a trowel or knife, preferably a week before planting. Gradually harden plants by subjecting them to lower temperatures and spring breezes.
3. Move as much soil and as many roots as possible with each plant.
4. Transplant in the evening or on a cloudy day if possible.
5. Set the plants in holes  $\frac{1}{2}$  to 1 inch deeper than they were in the flats or pots.
6. Provide these young plants with early nourishment by watering them with a starter solution. Use a liquid fertilizer as described under the section on fertilizers.
7. Firm the soil around the roots.

## Frost and Wind Protection

Tender transplants often benefit from protection against frost and cold winds. If you transplant tomatoes, peppers, melons, and other tender plants into the garden early in the spring, you may want to cover them with protectors that will act like miniature greenhouses. The protectors should be made of a transparent material sturdy enough to withstand winds. Be sure to provide ventilation for the plants by tearing or punching small holes in the side of the cover.

Covers, commonly called hotcaps or hotents, are available from most garden supply stores.

If you have decided not to use frost protectors, and a frost is forecast on a particular evening, you may cover your garden plants with a number of materials, including straw, cardboard boxes, blankets and so forth. Be sure to uncover the plants the following morning, however.

## Weed Control

**Cultivation**—Cultivate as often as necessary to keep weeds under control. Avoid deep cultivation; it destroys plant roots and is less effective than shallow cultivation.

**Mulches**—A very effective means of controlling weeds is to cover the soil between rows of vegetables with a mulch. Cucumbers, eggplant, lima beans, melons, okra, peppers, potatoes, pumpkins, squash and tomatoes are some of the crops which are most practical to mulch. Besides controlling weeds, the mulch will conserve moisture and keep the fruit clean. However, certain types of insects (slugs, millipedes, and similar pests) are often more numerous when mulches are used.

Materials that can be used for mulching include leaves, grass clippings, peat moss, sawdust, ground corn cobs, straw, hay, shavings, paper, cardboard and black plastic. The mulch should be 2 to 4 inches deep and completely cover the soil to prevent weed growth. Organic mulches, such as sawdust, straw and corn cobs, decompose during the growing season, however, and the soil organisms that cause them to rot compete with the plants for nitrogen. Therefore, it will be necessary to supply extra nitrogen to allow for this. A pound of actual nitrogen per 100 pounds of fresh sawdust or other dry organic material should be satisfactory. The nitrogen should be applied in at least 2, and preferably more applications during the season to make certain that it is present when needed.

Black plastic can also be used as a mulch. It has the additional advantage of warming the soil and hastening maturity. Black plastic does not break down readily and should be removed in the fall. Clear plastic should not be used because weed growth under it will compete with the vegetable

plants. Use plastic 3 to 4 ft. wide and 1½ mils thick. The soil should be fertilized before putting the plastic down.

Place the plastic and cover the edges with soil to hold it in place. Cut holes at the desired spacing and place the transplants (tomatoes and vine crops) or seed (squash) in the soil. Anchor the plastic around the hill with soil or rocks to prevent wind blowing the plastic. Plants can be watered through the holes where the plants were placed.

Black plastic may be obtained at many garden stores, through mail order catalogs, seed and nursery catalogs and companies advertising in garden magazines.

Chemical weed control is generally not recommended for the home garden.

## Watering

When there is not sufficient rainfall, water thoroughly once a week during the summer, if possible. Enough water should be added to thoroughly moisten the soil to at least 6 inches. Young plants should be watered after they are transplanted.

Many methods are available for adding water: hand watering, sprinkler or soaker hoses, overhead sprinkler heads, and a new method known as trickle irrigation. Trickle irrigation involves the use of a plastic pipe (½ to ¾" is usually sufficient) and a series of small diameter tubes leading from the plastic pipe to such plants as tomatoes, peppers, cucumbers, etc. A low volume of water can be applied in an hour or so at a very low pressure which most water pumps can deliver easily. Another method using low water pressure, has a plastic hose inside another, through which the water moves at 2 to 3 pounds of pressure. Both the inner hose and the outer hose have small outlets through which the water moves, allowing the water to be delivered evenly from one end of the hose to the other. This double hose is quite inexpensive and can easily be attached to a garden hose. It can be purchased with the outlets in the outer hose a few inches apart or as much as 3 feet apart. It is commonly used where plants are spaced close together, such as lettuce and beans.

## General Pest Control

Vegetables are damaged by insect and disease-causing organisms throughout the growing season. When weather and other conditions favor these pests, a large part of a garden crop may be destroyed before harvest. Properly applied chemicals will prevent most insect and disease losses.

Insecticides and fungicides, although effective in controlling a large number of garden pests, will not eradicate all insects or cure all diseases. Plant diseases can rarely be cured, but must be controlled by prevention.

The following measures will help reduce losses by insects and diseases:

1. Use fertile, well-drained soil.
2. Plant crops that are suited to the soil and climate. (Order seeds from local seed companies or those located in the Midwest or Northeast).
3. Control weeds and grass which provide protection for insects and diseases.
4. Purchase disease-free seed.
5. If available, buy insecticide-fungicide treated seed to protect against decay, damping-off organisms and certain insects. Treatment may be done by the grower.
6. Purchase disease-free plants; make sure they do not have swellings on the roots, cankers on the stems, or spots on the leaves.
7. Grow disease resistant varieties, if available. Resistant varieties are available for only a few diseases of certain crops. Some of these varieties are highly resistant; others give partial protection (for example, verticillium and fusarium wilt-resistant tomatoes and muskmelons).
8. Destroy plants of each annual crop as soon as harvest is completed.
9. Stay out of the garden when plants are wet.
10. Avoid unnecessary use of insecticides that may kill beneficial insects.

Since most bacteria, fungi, and some home garden insects live in the soil from one growing season to the next, much of their damage can be avoided by relocating the garden or rotating the crops.

Closely related crops, like melons and cucumbers or tomatoes, potatoes, peppers and eggplant should not succeed each other, because they are usually damaged by the same pests. Also, if the garden is to be planted on sod land with high populations of white grubs and wireworms, wait at least 2 years after plowing or spading the land before planting; otherwise, it is necessary to treat the soil with a chemical.

**Wilt Diseases**—Tomatoes, potatoes, eggplant, muskmelon and cucumbers are very susceptible to wilt. Planting available resistant varieties is the most satisfactory control practice. Rotation with non-susceptible crops is useful in the case of the fungus wilts in reducing the population of the organisms in the soil. In some cases, chemical treatment may be necessary.

## Underground Insects

The roots, stems, bulbs, tubers and other underground parts of garden plants are often damaged by insects. To control these insects, a chemical must be properly applied to the soil. Some of these insects go through 3 or more generations per year (maggots); others, only 1 generation per year (cutworms); and still others require 3 years (white grubs) to 6 years (wireworms) to complete one generation.

**Maggots**—Maggots are the immature stage of flies. They are whitish or yellowish-white, and about 1/3 inch long when mature. There are onion maggots, cabbage maggots and radish and turnip maggots. The adults of these maggots are grayish flies with numerous black bristles on their abdomens.

**Cutworms**—Cutworms are the immature stage of moths. They are usually fat and spongy in appearance and dark colored with various light or darker markings. Adult moths are brown-to-gray with light and dark markings. Moths are often seen flying around lights at night in mid-summer.

**White Grubs and Wireworms**—White grubs are the immature stage of the June beetles. They are white, "C" shaped with brown heads, have 6 long thoracic legs and the tip of the abdomen is dark brown or purple. Wireworms are the immature stage of click beetles. They are dark brown with 6 short thoracic legs and very tough skinned.

**Nematodes**—Problems caused by these minute, wormlike animals can be severe since many home gardens are not rotated and most vegetables are highly susceptible to plant parasitic nematodes. Roots of nematode-infected plants may have galls, surface lesions and/or be greatly reduced in number and vigor. Such plants may appear stunted and exhibit a nutrient deficiency. Certain nematodes may attack above ground plant parts, causing foliar necrosis and distorted leaves or buds. The effort and expense spent controlling nematodes in the home garden will be compensated by improved quality and yields.

Crop rotation and relocating the garden site help reduce nematode damage. If these cultural practices are not feasible or nematode populations are high, consider fumigating the soil.

## Aboveground Insects

For best control of insects and diseases, spray vegetables each week with a fungicide and/or a bactericide, plus 1 or more insecticides. Start application when the plants emerge and continue through the growing season. Some chemicals have limitations on their use close to harvest. Therefore, **read the package label before using any chemical; Follow directions carefully. Keep out of reach of children.**

Fungicide and insecticide dust combinations may be used instead of sprays. Buy dusts ready-mixed. Fungicides and insecticides are available at

most agricultural or garden supply and hardware stores.

Many types of hand-operated equipment are available. Whatever its kind, use it to apply treatments to *both the top, and especially the underside*, of the leaves. Anything less than this coverage often gives inferior results. Spray all parts of the plant to a point of run-off. One quart should cover 50 feet of row when plants are young and about half that distance when full grown. When dusting, apply only a *light coating*. Approximately 1 ounce of dust is enough for 50 feet of row early in the season, while 2 ounces, or more, will be required later.

The bacteria, *Bacillus thuringiensis*, is an effective biological (non-chemical) control for the cabbage looper and imported cabbage worm on cabbage, cauliflower, broccoli, and other crops. It is sold under various trade names. This bacteria will not control other pests such as aphids, leafhoppers, grasshoppers, tarnished plant bug and others.

For additional information, write for U. S. Department of Agriculture Home and Garden Bulletin No. 46, Insects and Diseases of Vegetables in the Home Garden, available from the superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Or, write for Extension Bulletin E-760 (A) variety recommendations or E-760 (B), disease, insect control for the home vegetable garden available from the MSU Bulletin Office, P.O. Box 231, East Lansing, Michigan 48824.

## Organic Gardening

Organic gardening is gardening without using manufactured chemical fertilizers and pesticides. The use of mulches, compost and manures is emphasized. Methods of insect control include the use of resistant varieties, sanitation, trapping and hand-picking insects, using beneficial insects, etc.

Organic gardeners often claim vegetables grown organically taste better than those grown otherwise. What they often mean is that home-grown fresh vegetables taste better than store-bought vegetables. This is particularly true with beans, lettuce, sweet corn and tomatoes which usually cannot be purchased garden fresh. The difference in taste is related to the difference in harvesting and not to the cultural methods. Also, vegetables seem to taste better if you produce them yourself.

As a hobby, organic gardening has merit. It is an excellent form of outdoor recreation that promotes physical fitness. But commercial farming without the use of fertilizers and pesticides will not feed the existing population.

The use of parasites and predators (biological control) is very effective where insect damage is not directly on the edible fruits or vegetables. However, when the edible parts are damaged, the parasites and predators are seldom present in suf-

## COMMON INSECT PROBLEMS

Insects	Crops	Insects	Crops
Aphid	Cabbage, Cucumbers, Melons, Peas, Potatoes, Tomatoes	Cutworm	Most garden crops
Blister beetle	Beans, Corn, Potatoes, Tomatoes	Flea beetle	Most garden crops
Cabbage worms	Broccoli, Cabbage, Cauliflower, Greens	Grasshopper	Most garden crops
Corn earworm	Corn, Tomatoes	Hornworm	Tomatoes
European cornborer	Corn, Peppers	Leafhopper	Beans, Carrots, Cucumbers, Melons, Potatoes
Striped cucumber beetle and spotted cucumber beetle	Cucumbers, Melons, Pumpkins, Squash	Mexican bean beetle	Beans
		Potato beetle	Eggplant, Potatoes, Tomatoes
		Squash bug	Pumpkins, Squash
		Squash vine borer	Pumpkins, Squash

## COMMON DISEASE PROBLEMS

Crops	Diseases	Crops	Diseases
Asparagus	Rust	Cucumbers, Pumpkins, Squash	Bacterial wilt, Scab, Mosaic, Leaf and fruit diseases
Beans	Mosaic, Leaf and pod diseases	Eggplant	Fruit rot, Wilt
Beets, Swiss Chard, Spinach	Leaf diseases	Muskmelons, Honeydew Melons, Watermelons	Fusarium Wilt, Bacterial Wilt, Leaf and fruit diseases.
Cabbage, Broccoli, Brussels sprouts, Cauliflower, Chinese cabbage, Kale, Collards, Kohlrabi, Mustard, Rutabaga, Radish, Turnip	Yellows, Blackleg, Black rot, Club root	Onions, Garlic, Chives	Leaf diseases, Smut
Carrots, Parsnips	Leaf diseases, Yellows	Peas	Fusarium Wilt, Root rots
		Potatoes	Tuber diseases, Leaf diseases
		Tomatoes, Peppers	Fusarium Wilt, Leaf and fruit diseases

ficient numbers nor can they build up their numbers rapidly enough to prevent this early damage. When additional predators are placed in the garden to hasten the natural buildup, control *may* be gained with less early damage. However, when control is gained, the host insect (pest) is reduced to such low numbers that the parasites and predators leave in search of food or starve to death. When these predators and parasites are gone or in extremely low numbers, the pests and their damage increase and the whole cycle repeats itself. Results of using biological controls in home gardens have been largely insignificant and sometimes even disastrous. Caution: live insects shipped *into* or *within* Michigan must be shipped under permit. Check with the supplier of such insects as ladybug beetles and praying mantis to insure that a permit has been issued to him. This is to prevent the introduction of parasites and predators (or pests) which could be more damaging than the insect pest you want to control.

For those who want to garden organically, the following suggestions may be helpful:

1. Avoid growing vegetables that are prone to attacks by insects (e.g. cabbage, cauliflower, broccoli and potatoes).

2. Use resistant varieties. (Check seed catalogs for this information.) Many new tomato varieties are resistant to verticillium and fusarium diseases, and are marked VF.

3. Use animal or artificial manure (compost) to buildup soil. Large amounts of animal manure are needed to supply the same amount of nitrogen, phosphorus and potash that is recommended for most garden soils. For a new garden plot, an application of 15 to 20 tons of decomposed cattle or horse manure to a half-acre garden is recommended. This should be plowed-down a month before planting. In succeeding years, apply 8 to 10 tons of cattle or horse manure per acre.

4. Do not use materials infected with disease or insects for compost.

5. Handpick Colorado potato beetles, tomato hornworms and other insects as they appear.

6. Trap squash bugs under boards placed on soil around plants and destroy every morning.

7. Grow Butternut squash if squash vine borers are a problem.

8. Use ashes around strawberry and other plants where slugs are a problem.

9. Put mineral oil on corn silk one day after silking to reduce damage from corn earworm.

10. Use rotenone or pyrethrum to control insects that can't be controlled by other methods, following the directions on the label. Both of these insecticides are plant products, have low toxicity, and are commonly used by organic gardeners.

Additional information on Organic Gardening is available in: "Organic Gardening", A Sunset Book, published by Lane Books and in other books.

## Ornamental Vegetables

There are many vegetables which can be grown as ornamentals. Some have been developed for their showiness and are also edible; some are novelty type plants or conversation starters, and some are regular vegetables which could be used as ornamentals much more than at present.

There are some varieties of corn which could be used as ornamentals. Indian corn, with its infinite variety of kernel colors, is a popular plant during the fall. There are also some varieties of corn which have different colored leaves including green and red or green and white striped leaves. Strawberry popcorn is another popular ornamental.

Asparagus is a good ornamental, and good to eat. The fern is attractive and some plants have bright, orange-red berries. Some ornamental types of asparagus are not edible.

Several members of the onion family are very attractive with pretty flowers, including chives, garlic and many purely ornamental Alliums.

The cabbage family has many vegetables which can also serve as ornamentals. Green or purple-headed cauliflower and broccoli varieties are good examples. The pigmented cauliflower does not have to be tied as does the white variety. There are both red and white varieties of kohlrabi, a very interesting plant with a swollen stem. Red and white cabbages with smooth and savoy (krinkle) leaves, and flowering types, such as ornamental cabbages and kale varieties are available. The flowering cabbages develop bright colors in cool weather in the fall. Kale varieties grown for eating purposes are also very interesting plants.

Snap beans, including green-, yellow-, and purple-podded beans, can be very interesting ornamentals. The purple-podded bean turns green when cooked—an indication that it is cooked sufficiently for freezing. There are also yard long beans.

Okra, a vegetable popular in the South, is a very attractive plant with very striking flowers and fruits.

There are many tomatoes with different shapes, sizes and colors, including white, orange, red and pink. Cherry tomatoes are quite small and some varieties such as *Small Fry* can be easily grown in containers.

Eggplant is another very attractive plant with beautiful flowers, green foliage and dark-purple fruit. There are also white-fruited varieties. Several different colored peppers, such as red, yellow, orange and green can be used as ornamentals.

Gourds, which come in many shapes and colors, are grown as ornamentals. Their fruit is used for decoration in the fall.

Cucumbers are quite interesting, especially the long Chinese and white types.

There are several types of lettuce with different leaf shapes and colors (for example Oak Leaf lettuce, and Ruby or Salad Bowl lettuce).

Some of the novelty type vegetables grown for conversation pieces are: *Eat-all* squash (entirely edible), salsify (called vegetable oyster), gherkins, ground cherry, vegetable spaghetti, serpent cucumbers, winter radishes, Burpless cucumber, peanuts, celtsue, yellow and purple potatoes.

Most herbs are also attractive and can be used as border plants or in beds, or small, ornately designed gardens, or perhaps between the spokes of an old wagon wheel.



## Container Gardening

Container gardening can provide food and enjoyment to the apartment or townhouse dweller who does not have a site for a garden. You will need containers, an artificial soil, and good seed. A well-lit window will greatly improve plant growth before containers are placed outdoors.

Containers should be large enough to hold your plants when mature. Containers such as clay and plastic pots, old pails and buckets, bushel baskets, and wooden boxes all work well. The size and number of containers will vary with the type of plants and available space. Six-inch pots are satisfactory for chives or similar crops; 10-inch pots for miniature tomatoes, radishes, or similar crops. Large plants, such as standard size tomatoes, can be grown in baskets, buckets, and pails. The container should have good drainage. Drainage can be improved by placing a layer of gravel or broken clay pots in the bottom of the container and/or by drilling holes along the side of containers that do not have drainage holes.

An artificial soil should be used in growing vegetables in containers—it is weed- and disease-free, lightweight, and holds moisture and nutrients. Artificial soils can be bought at seed and garden stores or prepared at home. To make an artificial soil, thoroughly mix 1 bushel each of peat moss and vermiculite, 1 pound of dolomitic limestone, ¼ pound of 20% superphosphate, and ½ pound of a 5-10-5 analysis fertilizer.

Only fresh, viable seed should be used. This information, including the date, is usually printed on the package. Old seed germinates poorly, and many seedlings are susceptible to damping-off dis-

ease. Select miniature, dwarf or bush varieties recommended for your area, and, where possible, choose varieties that are disease- and insect-resistant.

Most vegetables require full sunlight. Generally, leafy vegetables will tolerate more shading than either root or fruiting vegetables, and root vegetables will tolerate more shading than fruiting vegetables.

Seedlings should be started indoors on a window sill where they will receive plenty of sunlight. Clean trays, pans, milk cartons, and pots can be used for starting the seedlings. Also, peat pots or pellets containing an artificial soil can be bought from seed and garden stores. Seedlings should be transplanted to larger containers when the first 2 leaves are fully developed. Water thoroughly before transplanting. Be careful not to disturb the root system during transplanting. The plants should be hardened prior to placing them outdoors to grow (See "Transplanting," page 6.)

Your plants will require regular fertilizing and plenty of water. Fertilize with a water-soluble fertilizer, always following the manufacturer's directions, or apply 1 level teaspoon of 5-10-5 fertilizer, or similar analysis, per square foot of soil at 3-week intervals, beginning 3 weeks after transplanting. Mix the fertilizer into the top ½ inch of soil and water thoroughly. Never apply fertilizer to plants when the soil is dry; water thoroughly and apply fertilizer 1 or 2 hours later. Water your plants when the surface ½ inch of soil becomes dry. Apply enough water to do some leaching. Do not over-water, especially if plastic or metal containers are used. Avoid wetting the leaves, since this encourages diseases.

Additional information on gardening in containers is available in: "Gardening in Containers", Brooklyn Botanic Gardening, 1000 Washington Ave., Brooklyn, New York 11225, or in a handbook by the same title published by Lane Books for the Sunset series. Also write for U. S. Department of Agriculture Home and Garden Bulletin No. 163, "Minigardens for Vegetables", available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402.

## Hints on Storage of Vegetables

If you have a good-sized garden, you will not be able to eat all of the vegetables when they are ready to be harvested. Instead of letting them go to waste, store some of these vegetables for use later in the fall and winter, when fresh produce is scarce.

You can store certain vegetables for rather long periods and still retain a very acceptable product. The main point to remember is that quality is rarely improved by storage; at best, you can only maintain the quality that went into storage.

The storage area and containers should be as clean as possible. Vegetables should be harvested during the coolest part of the day (usually early morning) so that they contain less field heat which must be removed to maintain a cool storage temperature. The amount of each kind of vegetable to store will depend upon the size of your family and tastes and the amount of canning and freezing you do. Each type of vegetable has its own needs for best storage temperature and humidity conditions. No vegetable should be allowed to freeze. Do not store vegetables with apples or pears because the latter give off the chemical, ethylene, which may limit vegetable storage life or reduce quality.

## Storage Conditions

Following are the conditions required for longest storage of vegetables normally stored:

- Carrots, beets, parsnips, salsify, rutabaga, and Jerusalem artichokes should be stored as close to 32° F as possible (without freezing), and in high relative humidity. Perforated plastic bags or garbage can liners are useful for keeping the humidity high. Root crops can be buried in moist sand or slightly moistened vermiculite to prevent drying out and shriveling. Parsnips, salsify, and Jerusalem artichokes can be left in the ground, mulched heavily with straw or leaves and dug in the spring. This practice will, in fact, increase the sugar content of parsnips and salsify.

- Potatoes should be stored at 40 to 45° F and high humidity in a dark area to prevent greening and the change of starch to sugar.

- Cabbage, cauliflower, celery, and Chinese cabbage should be stored at 32° F and high relative humidity. Cabbage will store best if pulled up and replanted in sand. Since cabbage and its relatives have a peculiar odor, it is probably best to store them outside the house.

- Onions should be stored near 32° F but under low humidity; otherwise, sprouting and rooting will be promoted.

- Pumpkins and winter squash (storage types) should not be stored below 50 to 55° F, or they will rot and deteriorate. Humidity should be low.

- Tomatoes can be harvested green just before a frost and stored where temperatures do not go below 50 to 55° F. Lower temperatures will result in rotting and abnormal ripening. To hasten ripening, bring a few out of storage at a time into room temperature.

- Popcorn should be harvested when the stalk dries, and allowed to dry on the cob for several weeks or months. Test-pop every few weeks to determine when the moisture content is at the proper stage for best popping. Remove the kernels when this stage is reached and place in sealed jars. Place an apple or small rolls of blotter paper soaked in saturated salt solution in each 2-quart jar of shelled popcorn to maintain the proper moisture content.

Obviously, not everyone has the perfect storage in his home. The conditions discussed are for ideal storage — try to get as close to these conditions as possible.

### Types of Storage

Following are some suggestions for types of storage for the home gardener.

**Pits**—This is especially good for storage of root vegetables. Place the vegetables on the ground or in a hole 6 to 8 inches deep in the shape of a cone. Place a layer of straw (3 to 4 inches thick) around the vegetables and cover with 3 to 4 inches of soil. Pack the soil with a shovel and dig a drainage ditch around the pit. Use a small quantity of several different vegetables and several small pits rather than one large pit containing one vegetable.

**Barrel Storage**—Use a large garbage can or barrel. Pack the container with several alternating layers of straw and assorted vegetables. Set the barrel in the ground upright or slightly slanted. Cover the container with a good layer of straw and cover the straw with soil.

**Basement Storage**—Pick a corner of the basement with a window. Make a storage room with insulation. Bring cool, outside air into the

storage room through a cold air intake, with a ventilating flue into the room extending to the floor. Build it so you can open and close the inlet depending upon the weather. One part of the window can serve as the warm air outlet near the top of the room. Darken the window to prevent sunlight from entering the room, especially if storing potatoes. Cover openings to the outside with wire screen to keep out mice. The floor should be built of slats over about 3 inches of sand placed on the concrete floor. The sand, when moistened, will provide the proper humidity. Storages built in unheated garages or outbuildings will require thermostatically controlled heating and insulation. A maximum-minimum thermometer will be a great help in controlling the temperature of your storage room.

For additional information on home vegetable storage, write for U.S. Department of Agriculture Home and Garden Bulletin No. 8, Home Canning of Fruits and Vegetables, No. 10, Home Freezing of Fruits and Vegetables and No. 119 Storing Vegetables and Fruits in Basements, Cellars, Outbuildings, and Pits, available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402.



ASPARGUS

Asparagus is a perennial vegetable which can be harvested for 15 to 20 consecutive years. It prefers a deep, well-drained, sandy loam soil for best root production. The soil should be worked deeper than for most vegetables, and large amounts of organic matter (humus, manure, peat moss) should be incorporated to a depth of 14 to 16 inches. Four or 5 pounds of a good garden fertilizer such as 5-20-20 should be applied per 100 square feet of bed.

Asparagus can be propagated by seeds or roots, but it is generally more convenient to buy 1-year-old roots. Seed should be sown to one side of the garden in 3 to 5 foot rows. Sow 1 or 2 seeds per inch of row, 1 to 1½ inch deep, as soon as possible after the danger of spring frost. Since asparagus seed is slow to germinate, it may be necessary to mark rows with a few radish seeds. Weed carefully; plants emerge as thin, straight shoots and are difficult to see. Seedlings can be left to grow in the row and thinned to 18-inches apart.



## Culture of Specific Vegetables

Roots may be dug early the following spring, sorted for size and vigor, and transplanted to permanent beds. Roots should be planted in 6-to-8-inch deep furrows and covered with only 2 inches of soil. The furrow should be gradually filled as the new shoots emerge. Cultivate to 4 inches deep the first fall. In early spring, fertilize with a complete analysis fertilizer and cultivate lightly.

Do not cut shoots the first 2 seasons; harvest up to 4 or 5 weeks in the third season and until June or early July in later years. A second fertilizer application should be made at the end of the harvest season. The tops can be left standing over winter and returned to the soil with a shallow spring cultivation or cut and removed in late fall. If diseases are present, it may be best to cut and burn or compost the tops in the fall.

Fine-ground salt is still used for killing weeds in established asparagus beds in small gardens. Spray small weeds with a solution of 2 pounds per gallon of water.

## BEANS (LIMA)

Lima beans have basically the same cultural requirements as snap beans but are more sensitive to soil temperature and require a longer growing season (about 4 months) than snap beans. For maximum germination, plant only after the soil temperature is above 60°F. Also, small-seeded varieties mature in a shorter period than large-seeded varieties.

Lima beans prefer a soil that is coarse-to-medium textured, well-drained and moderately organic. Since lima beans are legumes (nitrogen-fixing plants), the soil should not be heavily fertilized. Sow the seed 2 to 4 inches apart, 1 to 2 inches deep, in rows 1½ to 2 feet apart; thin plants to 3 to 4 inches apart. Pole varieties may be planted in rows or hills with support being provided by a trellis or poles 4 to 6 feet high. Plant 6 seeds in each hill and thin to 2 or 3 plants. For successive harvesting, make several plantings at 2-week intervals.

## BEANS (SNAP)

Snap beans will grow in a variety of soils but prefer a deep, well-drained, friable soil. They are sensitive to soil temperature but not as sensitive as lima beans. Plantings should be made on warm soil, after the danger of spring frost. Seeds should be sown 2 inches apart, 1 to 2 inches deep, in rows 1½ to 2 feet apart; thin plants to 3 to 4 inches apart.

In small gardens, pole varieties planted in rows 6 feet apart or hills 3 feet apart may be more adaptable. Thin pole varieties to 4 to 6 inches apart. Provide support with 4-to 6-foot poles or a trellis.

Plantings made at 2-week intervals provide harvesting throughout the summer. To keep the plants bearing over a longer period, harvest the pods often and before the seeds start to mature.

## BEETS

Beets are usually grown for their fleshy roots, but the tops can be used for greens. They prefer a deep, fertile, well-drained, well-prepared sandy loam soil. They are sensitive to strongly acid soils. Plant early after danger of spring frost. Three or 4 successive plantings may be made at 3-or 4-week intervals, the last planting about July 1 in central Michigan.

Beets should be planted in 18 to 24 inch rows, 1 or 2 seeds per inch, ½ to 1 inch deep; thin to 2 or 3 inches apart while the plants are small, about 6 inches high. The tops of the thinned plants can be used as beet greens. Since beet seeds are slow to germinate, especially during mid-summer, the row may be marked with a few radish seeds. Make mid-summer plantings slightly deeper and keep the seedbed moist. They will mature in 60 to 80 days.



## BROCCOLI, BRUSSELS SPROUTS, CAULIFLOWER

Broccoli, Brussels sprouts, and cauliflower are all frost-hardy, cool-season crops. Broccoli requires 55 to 75 days from transplanting to harvest; Brussels sprouts about 90 to 95, and cauliflower, 60 to 95 days. They can be grown in all areas of Michigan. For summer and fall use, 2 plantings of broccoli can be made; an early crop can be started from transplants set outdoors in late April or early May, and a late crop can be sown outdoors in early spring through June. Brussels sprouts and cauliflower do best when grown as a fall crop since they are sensitive to hot, dry summer weather. (Though transplants can be grown at home, it is usually more convenient to buy small, healthy plants from a reputable nurseryman.)

These crops prefer a very fertile, moist soil and a cool, humid atmosphere. They have the same cultural requirements as cabbage but are more frost hardy and respond well to fertilizer. One or 2 sidedressings\* of a nitrogen fertilizer at monthly intervals will greatly improve the quality of these crops. Small transplants, about 6 inches tall, should be set in warm, moist soil. Plant in rows spaced 2½ feet apart with 18 to 24 inches of space between plants.

To stimulate the abundant production of side shoots in the axil of broccoli leaves, the large center head should be cut before any buds begin to open. The lower leaves and stems of Brussels sprouts should be removed when sprouts are formed; always leave the top leaves. Harvest the largest sprouts as they become ready. Mid-September pinching of the growing point of Brussels sprouts encourages more rapid development of the upper sprouts. For fall use, the entire plant can be dug prior to very cold weather and stored in a cool cellar or cold frame where moist soil should be packed around the roots. When the heads of cauliflower are 2 to 3 inches in diameter, they should be blanched by drawing the larger leaves over the heads and tying them with twine or rubber bands. Use different colored rubber bands or twine to indicate different harvest dates. The time between tying and harvesting may vary from 4 to 5 days to 2 weeks. Green and purple varieties of cauliflower do not need to be blanched.

\* Use 1 pound of urea or 1½ pounds of ammonium nitrate per 1,000 square feet.

## CABBAGE

Cabbage is a frost-hardy crop which can be grown in all areas of Michigan. It is not as frost hardy as broccoli, Brussels sprouts, or cauliflower and requires between 65 to 100 days from transplanting to harvesting. Cabbage will grow on a variety of soils, but prefers a moist, very fertile, well-drained sandy loam or light clay loam. For successive harvesting, early, mid-season and late varieties can be planted.

Transplant cabbage in early April or late June. Soil should be worked deep and fertilized well prior to planting. Plant in rows spaced 2 to 2½ feet apart with 18 to 24 inches of space between plants. If transplants are to be home-grown, they should be started from treated seed planted 4 to 6 weeks prior to transplanting. Generally, it is more convenient to buy transplants. Two sidedressings (see footnote, p. 13) of a nitrogen fertilizer at monthly intervals will greatly improve the quality of cabbage.



## CARROTS

Carrots are grown for their fleshy taproots which require 65 to 85 days from planting to harvesting. They prefer a deep, moist, well-drained, friable sandy loam or organic soil that does not crust.

Plant in 1½ to 2 foot rows, not deeper than 1 inch, and as early in spring as the soil can be worked. Two or 3 successive plantings at monthly intervals will lengthen the harvest season. Thin plants to 1 to 2 inches apart as soon as they come up. To avoid damaging the roots, minimum tillage should be practiced. A light sidedressing of fertilizer shortly after seedlings emerge will greatly improve quality. If left in the soil to mature, the carrot will become woody.

## CELERY

Celery prefers a deep, moist, well-drained medium-textured organic or very fertile loam soil. It matures in 100 to 125 days after transplanting. An early and a late crop can be planted.

Plant celery in rows spaced 1½ to 2 feet apart with spacings of 4 to 8 inches between plants. Seeds are small and slow to germinate; sow lightly, 1/16 inch deep, or broadcast. It may be necessary to mark rows with a few radish seeds. The crop should be sown indoors in mid-February to mid-March and transplanted in April or May. Celery responds well to well-rotted manure and sidedressings of a nitrate fertilizer. Plants may be blanched

by growing them in trenches and filling gradually as the plants mature or by placing boards or drain tile around them.

## CHINESE CABBAGE

Chinese cabbage is a cool-season crop best grown for fall use as salads or greens. It is more closely related to mustard than to cabbage but has cultural requirements similar to cabbage and kale. It matures in 8 to 10 weeks.

Chinese cabbage can be grown on any good garden soil but prefers a rich, moist, well-drained soil. Sow seeds ½ inch deep and ½ to 1 inch apart in rows 2 to 2½ feet apart. Thin plants to 12 inches apart; thinned plants can be used for salads or greens. If planted too early, plants may go to seed; plant after late June.

## COLLARDS

Collards resemble a tall-growing cabbage but produce larger leaves and do not head. They have the same cultural requirements as cabbage but are more heat tolerant. They are best grown from transplants started indoors in early April and transplanted outdoors in early May. Later crops can be sown directly in the garden in early June. Plant in rows 1½ to 2 feet apart and thin to 6 to 8 inches apart. Use thinned plants for greens.

## CORN (Popcorn, Sweetcorn)

Popcorn and sweetcorn have the same cultural requirements. Popcorn is allowed to mature and dry on the stalk, whereas sweetcorn should be picked in the milk stage. A succession of sweetcorn can be obtained by planting varieties which ripen at different times, or by planting one variety at 10-day to 2-week intervals from the time it is safe to plant until about the first week in July. Make successive plantings when the preceding planting is 3 to 4 inches tall. Varieties that will mature in your area should be chosen. Popcorn should be planted between May 20 and June 1 since it requires 90 to 120 days to mature.

Corn can be planted in rows 2½ to 3 feet apart with the plants thinned 10 to 12 inches apart in the row, or in hills spaced 3 feet apart each way. For hill planting, drop 5 to 6 seeds in each hill; thin the seedlings to 3 to a hill when 4 or 5 inches tall.

Since corn depends upon wind for pollination, plant at least 2 short rows of each crop rather than 1 long row. Removing the suckers from sweet corn is not necessary; this practice has proven to be harmful when done after the plants have started to tassel.



In small gardens, squash or pumpkins are sometimes planted in the early corn to save space. This practice proves satisfactory only when the soil is sufficiently well fertilized and enough water is available. In a dry season, however, both crops will be inferior. This should not be practiced with popcorn since it must mature on the stalk and will compete with the squash or pumpkins for water, sunlight, and fertilizer.

### CUCUMBER

The cucumber is a warm weather crop which prefers a rich sandy loam or loamy sand containing an abundance of organic matter and plenty of fertilizer. There are two kinds of cucumbers: those developed for pickling and those developed for use in salads, known as slicers. Gynoecious and monoecious types are available. Gynoecious types have all female flowers and produce more concentrated and earlier fruit.

Cucumber should be planted to one side of the garden in rows or hills spaced 4 to 6 feet apart. Avoid soils that crust after rain. Sow 8 to 10 seeds per hill or 4 to 5 seeds per foot of row. Thin plants sown in rows to 1 per foot. Thinned plants can be transplanted. Plant when the soil temperature is above 60°F, usually after June 1 in central Michigan. To keep vines producing, pick regularly, especially with pickles.



EGGPLANT

Eggplant is a warm season crop requiring a growing season of 70 to 80 days. It prefers a fairly rich, warm, sandy soil and responds well to irrigation and applications of a complete fertilizer.

Eggplants do not transplant easily but should be started indoors in late March and transplanted in late May. Sow seeds  $\frac{1}{4}$  inch deep. Temperatures between 70° and 90°F are necessary for seedling emergence. Thin or transplant to spacings of 24 to 30 inches in rows 2 to 2½ feet apart. Do not disturb the root system when transplanting. Harvest the fruit while it is still shiny and on the young side, about  $\frac{3}{4}$  its full size.

### ENDIVE

Endive is a cool season crop grown for salads and greens. It will tolerate light frost and should be grown for fall use. Endive prefers a warm, moist, well-drained soil and responds well to fertilizer, irrigation, and cultivation. Cultural requirements are the same as for lettuce, but endive is less sensitive to heat than lettuce.

Sow 2 or 3 seeds per inch in rows 1 to 1½ feet apart. Sow seeds  $\frac{1}{2}$  inch deep. Leaves can be blanched by gathering and tying them loosely together when nearly full grown. Leaves should be dry when tied.

### KALE

Kale is a cool weather crop having the same cultural requirements as cabbage. It is a member of the cabbage family but does not head and should be grown for fall and winter use. It is grown for greens and is one of the best sources of vitamins and minerals in the garden.

Sow 1 or 2 seeds per inch,  $\frac{1}{2}$  to 1 inch deep, in rows spaced 1½ to 2 feet apart. Plant in late June or July. Thin to spacings of 8 to 15 inches. Old kale is tough and stringy. The flavor is improved by light frost. A light mulch of straw may be used to extend the harvest season into winter.

### KOHLRABI

Kohlrabi is a cool-season crop grown for its thickened stem. It is a short-season crop and is best grown during the cool days of fall. Kohlrabi should be harvested while young and tender, about 2 or 3 inches in diameter. Rapid and continuous growth improves its tenderness. Large stems become woody.

Kohlrabi prefers a rich, moist, well-cultivated soil and can be planted in late March or late June, or started early in a hotbed or greenhouse and transplanted like cabbage. Sow 1 or 2 seeds per inch in rows 1½ to 2 feet apart. Thin to 4 to 8 inches apart. Successive plantings at 2-week intervals will extend the harvest season.



### LEEKS

Leeks resemble onions in their cultural requirements and adaptability. They prefer a very rich, moist, well-drained soil and are very slow-growing. They are grown for their fleshy, blanched roots.

Leeks are usually started from seeds. By starting them indoors in early February or March and transplanting them, an early crop can be harvested. Transplants should be set in 18 inch rows as early as possible. Plants should be started in furrows 4 to 6 inches deep. The furrows should be filled gradually as the plants grow.

The plants should mature by October. They can be pulled, or, if well-mulched, left in the ground over winter. If carefully dug, the plants can be replanted in storage.

Seed sown in September will also produce an early crop the following year.

### LETTUCE

Lettuce is a short season crop that matures in 45 to 85 days, depending on variety. It prefers a cool growing season with a mean temperature of 55° to 60°F.

Lettuce will grow on a variety of soils but prefers a rich sandy loam or muck soil. Seedling emergence may be a problem on mineral soils. Provide irrigation during dry weather and topdress with a nitrate fertilizer when half grown. To improve crispness, keep lettuce growing rapidly in moist, rich soil.

Plant in rows spaced 1 to 2 feet apart as early as the soil can be worked. Sow *leaf lettuce* from early spring to July; thin to 6 inches apart. Plant *head lettuce* throughout the season, making several plantings at 10-day intervals; thin to 8 to 15 inches apart. For summer use, start *head lettuce* indoors about mid-March and transplant in April. Harden plants before transplanting. (See "Transplanting", page 6.) For fall use, head lettuce should be sown directly in the garden about the last of July; thin to 8 to 15 inches apart.



### MELONS

Muskmelons need a long, warm, growing season and a rich, sandy-loam soil with plenty of moisture. Plant in hills spaced 4 to 5 feet each way. Dig a hole 12 to 15 inches deep; half fill it with rotted manure, then fill level-full with soil. Sow 5 seeds to the hill, then thin to the 3 best plants when they are about 4 inches tall. For earlier plants, sow 3 to 5 seeds in a pot or plant band indoors about May 1. Melons are very tender — seeds should not be planted outdoors until the ground has started to warm-up. Muskmelons are ready to pick when the melon will separate from the stem easily.

Handle watermelons much the same as muskmelons. They are heavy feeders and need lots of moisture. Prepare hills as for muskmelons, but space them 6 to 8 feet apart. Sow 6 to 8 seeds in each hill and thin to 3 plants per hill. Green watermelons give a sharp metallic ring when snapped with the fingers. Ripe ones give a dull, hollow sound. The tendril where the melon stem joins the vine usually turns brown when the fruit is ripe. The color of the rind in contact with the ground changes from white to light yellow as the melon ripens. Watermelons require a long growing season and may not mature in many areas of Michigan.

### MUSTARD

Mustard greens have a very short season and are easily grown in Michigan. Three or 4 successive plantings can be made at 10-day intervals, starting in early spring, to provide a supply of the crop in early summer. They can be sown again in late summer for a fall crop. Thin plants to 6 to 8 inches apart. Mustard greens will go to seed fairly soon after maturing, especially in mid-summer; cut them as soon as they are ready and cook like spinach.

### OKRA

Although okra is not grown much in Michigan, it is very popular throughout the South. It is used mostly in soups and mixed dishes and occasionally cooked alone. It grows best in hot weather. Sow in rows spaced about 2 to 2½ feet apart after the danger

of frost. Thin the seedlings to 12 to 15 inches apart in the row. Harvest the long pods within a few days after the flower petals have fallen; if allowed to remain on the plant too long, they will become tough and stringy. The young pods can be dried or canned for winter use.

## ONIONS

Onions can be grown from sets (small onions,  $\frac{1}{2}$  to  $\frac{3}{4}$  inch in diameter, produced the previous year from seed). They can also be grown from seed sown directly out doors just as soon as the ground can be worked, from plants grown from seed sown indoors in February, or from purchased plants.

Many gardeners make several successive plantings of sets for green onions during spring and early summer. Although these plants can be allowed to mature as dry bulbs, they are not usually as good for storage as those grown from seeds or plants.

Onions require a long season and make their best growth in the cool, early spring. They should be planted just as soon as the ground can be worked. Rows should be 12 to 18 inches apart and the seed sown thinly. The plants should be thinned to 2 to 3 inches apart in the row. The thinned plants can be used for green or boiling onions.



In late summer or early fall, when the tops have dried, the onions can be pulled and brought under cover to dry. Tops should then be cut off, leaving an inch of the stem on the bulb. Place the onions in slatted crates or coarse-mesh bags and store in a dry, dark, storage room at 32° F. If the tops have not started to die down when cold weather approaches or if they are dying down very irregularly, maturity can be hastened by breaking them over with a rake.

## PARSNIPS

Parsnips require a long season and should be sown as soon as the soil can be prepared. The seeds germinate slowly. Radish seeds can be mixed with them to mark the row, and also provide an extra crop in the same space. If sown too late, germination will be poor. Since parsnips root very deeply, prepare the soil to a depth of 12 inches or more.

The flavor of parsnips is improved by freezing; therefore, many gardeners leave them in the ground over winter and use them in late winter before they start to grow again. They can be dug in late fall and stored in sand, like carrots or other root crops. (See section on Vegetable Storage, p. 11.)



## PEAS

To grow peas successfully in Michigan, plant them very early — by May 15, at the latest, in southern Michigan. In favorable seasons, however, a fairly successful crop can be grown in the fall. They should be sown about July 15 to mature in September. For the spring crop, best results will be obtained by planting early, mid-season, and late varieties all at one time — as early as possible — rather than successive plantings.

Sow peas about an inch apart in the row in rows 12 to 18 inches apart. Tall varieties can be supported by stakes or branches 30 to 36 inches high in the ground alongside the row, by placing chicken wire alongside the row, or by wires and string.

Edible-podded peas are becoming quite popular. Their culture is similar to that of garden peas. They are ready to eat just as soon as the seeds start to form. They are cooked like snap beans, or can be eaten as shelled peas after the seeds have developed.

## PEPPERS

Pepper is a tender crop and requires a long season for top production. Plants can be started from seed sown indoors about March 25 and set out in the garden after all danger of frost is over. Transplant carefully to prevent checking growth which may cut production greatly. Irrigation will help during mid-summer when the plants will rather easily.

Peppers are ready to pick when they are firm and crisp. They are usually best while the color is still green, but are still very edible after turning red. "Hot" peppers that haven't ripened before frost can be pulled by the roots and hung in the basement where they will mature.

## POTATOES

The potato may prove a satisfactory crop for some home gardens. It is not recommended for the small garden or in heavy clay soil; nor for gardeners who are not prepared to protect it from insect and disease pests.

Potatoes grow best on well-drained, sandy-loam soil that is well supplied with organic matter. It does especially well when it follows an alfalfa or clover crop. Rye, planted in August or September and plowed down the following spring when 6 to 12 inches tall, adds organic matter and often reduces damage from scab. Potatoes should not be planted for at least 1 year after plowing sod because it is often infested with grubs which injure the potatoes. The soil should be plowed 6 to 8 inches deep in the spring and harrowed thoroughly so that it is in a mellow condition and free from lumps.



Certified seed potatoes are best because they are relatively free from disease and generally outyield non-certified seed potatoes. Michigan-certified seed is sold by individual growers, through farmers' organizations, and in some local seed stores.

If you want the crop for use in July or August, plant between April 20 to May 10, depending on location. For fall and winter use, plant between May 10 to June 1. Just before planting, cut the seed potatoes into pieces about the size of a hen's egg. Cut each piece in a square or blocky shape with at least 2 eyes. Cut-seed should be kept in a cool place until planting. Do not plant if soil is very wet or very hot and dry. Make rows 4 inches deep and 24 to 36 inches apart, using a small garden plow or large hoe. Drop seed in the row at intervals of about 10 to 12 inches and cover immediately with 2 inches of soil. As soon as the plants break through the ground, the remaining 2 inches of soil can be worked into the furrow.

The soil should be kept well cultivated during the first few weeks after planting so that all grass and weeds are destroyed. All cultivation should be shallow to prevent root injury. Stop cultivation when the plants begin to blossom and set tubers. Any weeds or grass that appear late in the season should be cut off at the surface of the ground with a sharp hoe. The soil should be kept quite level

when cultivating. It is not necessary to hill potatoes unless the soil is poorly drained or the new potatoes appear above the ground.

Harvesting should generally be delayed until the vines mature or have been killed by frost. Well-matured potatoes are of better eating quality than immature stock, and they keep better in storage. If possible, dig the crop on a day when the potatoes will dry off quickly. Dig and handle the potatoes carefully to prevent bruises and cuts. Allow the potatoes to dry-off before putting them in storage.

Success in storing potatoes depends largely upon the quality of the crop stored. Well-matured potatoes, relatively free from bruises and other defects, will keep best in storage. Take special care to store only sound stock. The storage cellar should be well insulated so that an even temperature of 40°F can be maintained during the winter months. The storage cellar must be kept dark to prevent potatoes from turning green and developing a bitter flavor.

## PUMPKINS

Pumpkins require so much space that they are seldom recommended for the small garden. Bush types can be used, however. They can be planted 4 feet apart each way. Pumpkins can be planted in early corn to save space if there is enough moisture and fertilizer to mature both crops. They do best in a well-drained, sandy-loam soil. Sow 4 to 6 seeds to each hill. Space hills of vining types 6 to 8 feet apart each way. Thin seedlings to 3 per hill.



## RADISHES

Radishes do best in cool weather with plenty of moisture. Under these conditions, they will grow rapidly and produce crisp roots. A few feet of row can be sown every 10 days throughout the summer to provide a continuous supply of this crop. However, since mid-summer plantings often become rather hot, many Michigan gardeners prefer to make 3 or 4 plantings in early spring, and perhaps 2 in the fall.

Sow winter radishes to be stored over winter in July and store like other root crops. They grow larger than summer radishes but have a very mild flavor and fine texture.

## RHUBARB

Rhubarb does best in a rich soil with plenty of moisture, but it should not be planted in a place where water is likely to stand in the spring.

Rhubarb is propagated by divisions of the old plant. The divisions can be planted either in late September or in early spring. Place the crowns just at the surface of the ground. Do not cut the stalks the first year after planting. After the first year, stop cutting about July 1. Anytime seed stalks appear, cut them off. An application of manure or commercial fertilizer about July 1 will help build up the plants for the coming year.

Rhubarb can be forced indoors for winter use. Dig a few plants just before the ground freezes. Leave the soil on them and leave outside until after several hard freezes. Put entire plants in the basement, pile sand around them and keep moist. The temperature should be between 50° and 60°F.

## RUTABAGA

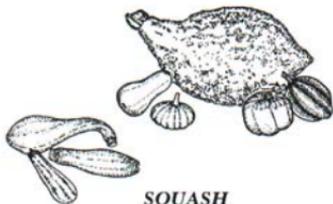
Although similar to turnips in many respects, rutabagas should be sown about a month earlier — not later than June 20 — for best results. They do best in a deep, rich, sandy-loam soil. Sow in rows 18 to 24 inches apart, and thin plants to 4 to 6 inches apart in the row. They will withstand light frost but should be dug before the ground freezes. The roots can be stored for winter use in sand at 33 to 40°F.

## SALSIFY

Salsify, or vegetable oyster roots, look like small parsnips; when cooked, they taste like oysters. They require a long season. As early in spring as possible, sow seed in rows 18 to 24 inches apart. Thin plants to 3 to 4 inches apart in the row. A rich, sandy-loam soil is necessary for this crop; otherwise, the roots will grow deformed. The roots can be dug late in the fall and stored, or they can be left in the ground and used during the winter if mulched with straw or leaves.

## SPINACH

Spinach is definitely an early spring or late fall crop. It should be sown just as early as the soil can be worked in the spring. A second crop can be sown about 2 weeks later, a third crop in late July for fall use. Late-spring or early-summer sowings will nearly always bolt to seed. Spinach does best in a neutral to slightly alkaline soil. Sow seeds in rows spaced 12 to 18 inches apart and thin plants to 3 to 6 inches apart. Swiss chard may be a better vegetable to grow during hot summer months.



SQUASH

There are 2 types of squash. *Summer* squash generally have bush vines and the fruits are eaten when young and immature. Most *winter* squash varieties have vines and the fruit should be allowed to ripen on the vine, but must be harvested before frost.

Squash is very tender and should not be planted until the ground has become warm in the spring. Plant the vining type in hills 5 to 6 feet apart; plant the bush type 3 to 4 feet apart each way. Sow 6 to 8 seeds in each hill, then thin all but the 3 best plants when the true leaves start to develop. For earlier squash, sow the seed indoors in individual containers about 3 to 4 weeks before time to set out. For best results, dig a hole 12 inches deep and 2 feet in diameter where each hill is to be; half-fill the hole with manure, then fill level with soil before planting.

To save space, plant squash at the edge of the garden and train the vines on the fence or on adjoining grass. Squash is sometimes planted in early corn, but in dry weather both crops will suffer. If this is done, cut the corn as soon as it matures. Where vine borers are troublesome, Butternut squash is particularly desirable.

## SWEET POTATOES

The sweet potato is a warm climate crop grown for its enlarged, tuberous roots. It prefers a warm, well-drained, deep, sandy-loam soil. Transplants are started from sprouts or "slips" of sweet potatoes grown in hotbeds. They require about 6 weeks growth prior to transplanting. It is usually more convenient to buy transplants from a nursery or plant dealer. The sweet potato is a long-season crop; plant as soon after the last frost as possible.

Sweet potato transplants should be set in ridges formed by turning 2 furrows together. Ridges should be spaced 3 feet apart and plants set 12 to 18 inches apart in the ridge. They respond well to good fertility. Control weeds until the vines cover the row.

Dig sweet potatoes on a warm, bright day after the first light frost. Let them lie on the ground long enough to dry. Cure them in a well-ventilated room at 80° for 2 to 3 weeks; store at 55 to 60° F in a dry place.

## SWISS CHARD

Swiss chard belongs to the beet family but does not produce an enlarged root, and is used only as a green. Because it continues to produce throughout the summer, some gardeners prefer chard to spinach.

Swiss chard seed can be sown very early in the spring in rows 18 to 24 inches apart. Thin the plants to 6 to 8 inches apart in the row. The first leaves will be ready to eat in about 60 days. By keeping the outer leaves cut, the plant will continue to produce high-quality greens throughout the summer and into the fall. The midrib of the leaf can be cut-out and cooked separately, like celery, or the entire leaf can be cooked as a green.



TOMATOES

Tomatoes are very tender and should not be planted outside until all danger of frost is past. Start plants indoors from seed sown about April 1. In southern Michigan, they can be seeded directly outdoors about May 10, but this practice is not usually recommended. A sandy-loam soil is best for tomatoes, particularly for the early crop; however, clay loam is very satisfactory for the late crops.

Tomatoes can be staked, caged, or allowed to spread over the ground. If staked, space the plants 2 to 3 feet apart, in rows 3 feet apart. If allowed to run, space 3 to 4 feet each way; caged plants should be spaced 2 to 3 feet, in rows 5 feet apart.

Although more plants are required to plant a given area when tomatoes are staked, production per plant is reduced by the pruning that is necessary and, consequently, production per square foot is not greatly increased. The main advantage in staking is that there is usually a higher percentage of perfect fruits. However, very little rotting will occur if a mulch of straw, grass clippings, or even pea vines is placed on the ground under plants to keep the fruit off the soil. The mulch will help to retain an even soil moisture content, and reduce injury from blossom-end rot which is caused by insufficient soil moisture.

When plants are staked, stakes at least 1½ inches square and 6 feet long should be driven securely at the spots where the plants are to be set. When vines are 12 to 15 inches long, remove all but 1 or 2 main stems and tie these loosely to the stake, using soft string or rags. Loop the string around the stake once to hold it in place, then fasten the string around the stem, preferably just below a large leaf.

The stem should not be drawn tightly against the stake.

Staked plants should be pruned every week or 10 days by removing the young branches that develop in the axils of leaves. Leaves should not be removed since they shade the fruits and prevent sunburning. Plants that are not staked do not need to be pruned.

Caging is a new method which has an advantage over staking in that no pruning is required. The cage is a wire cylinder, usually made from 6" x 6" or 8" x 8" mesh concrete reinforcement wire. However, any type of mesh wire can be used if the mesh is large enough to permit harvesting through it. If concrete reinforcement wire is used, an 18 to 24-inch diameter cylinder is made by hooking together the ends of a 4- to 5-foot section of wire. The bottom rung is cut away, and the prongs are pushed into the soil for support. The height of the cylinder may vary from 2½ to 5 feet and will depend upon the variety of tomato grown. Usually, small vined tomato varieties are best for caging. Tall cages or cages made from chicken wire may require staking for support. Cages should be placed over plants soon after transplanting.

Short, stocky plants are preferred for setting out. If the plants have become "leggy" however, they should be set deeply in the soil. Plants which are more than a foot tall should be placed in the soil rather deep and at an angle. This allows them to root out along the stem.



TURNIPS

Although turnips can be grown as a spring crop, maggots will be much less trouble if planted after July 1. Turnips mature quickly and can be planted as late as August 1 in southern Michigan. Sow seed in rows which are 18 to 24 inches apart. Thin seedlings to 4 to 6 inches apart in the row. Thinnings can be used for turnip greens. Like other other root crops, turnips can be stored over winter in outdoor pits or in moist sand in a storage room at 33° to 40°F.



## HERBS

Herbs are usually grown for flavoring foods, for providing fragrance in the garden, and as ornamentals. There are annual, biennial and perennial types. In Michigan, however, most tender perennials are treated as annuals. Herbs are marked (A) for annuals (B) for biennials and (P) for perennials.

Herbs can be dried easily by tying in small bunches and hanging upside down in a dark place.

Additional information on herbs can be found at most libraries. Two handbooks for beginners include: "Handbook on Herbs," available from Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, New York 11225; and "How To Grow Herbs", A Sunset Book, Published by Lane Books.

### ANISE (A)

Anise (*Pimpinella anisum*) is an annual belonging to the same family as carrots, celery, and parsley. It prefers a fertile, well-drained soil and is easily grown in the home garden.

Anise should do well on any soil which will produce a good crop of carrots. Seed should be sown no deeper than  $\frac{1}{2}$  inch in rows  $1\frac{1}{2}$  to 2 feet apart. Sow in a warm soil and thin plants to 10 inches apart in the row. Use fresh seed for good germination. Seed should be sown where the plants are to grow because anise does not transplant easily. Provide irrigation in dry weather.

The stalks should be cut as soon as the seed heads start to ripen and before they begin to shatter. Spread the cut plants on sheets of dry paper or cloth and allow them to dry thoroughly. Rub the seeds out of the cluster and separate from the chaff. Thoroughly dried seed, stored in a cloth bag where air can circulate about them, should keep for several years.

### BASIL (A)

Basil (*Ocimum spp.*) is an annual grown primarily for seasoning soups, stews, meats, and salads. It is also used as a house plant and for edging. The plant prefers a fertile, well-drained, sunny site, but will do well on most good garden soils.

Three species are commonly grown. They will attain a height of 12 to 24 inches and branch profusely. Bush basil (*Ocimum basilicum minimum*) has small leaves, attains a height of 12 inches, and is considered the best variety for cooking. It is propagated by both seeds and cuttings. Purple bush basil (*Ocimum minimum purpureum*) has the same growth habit as bush basil except that its leaves have a purplish cast. It is propagated by seeds and is considered best for vinegars. Sweet basil (*Ocimum basilicum*) attains a height of 24 inches, can be grown in sun or partial shade, and is propagated by seeds. It is used for seasoning tomatoes, salads, stews, soups, and in medicinal teas.

Basil seed should be sown in warm soil. Sow seeds  $\frac{1}{2}$  inch deep in rows spaced  $1\frac{1}{2}$  to 2 feet apart. Thin plants to 12 inches apart when they are 3 to 4 inches tall. Unlike anise, basil can be started indoors and transplanted when the soil warms-up in the spring. When flower buds appear, both these buds and tender leaves should be picked and used. The branches can also be cut, tied in bunches, dried (out of sunlight), and stored. The plant will continue to send out new shoots after the branches have been cut. In the fall, the plants can be dug, potted, and grown indoors for winter use.

### CARAWAY (B)

Caraway (*Carum carvi*) is a biennial belonging to the same family as anise, carrot, celery, and parsley. Its seed is used as a flavoring in bread, cakes, and sometimes cheese. Seed production in this plant is favored by dry, sunny weather and a well-drained soil that is not too rich.

Seeds of caraway should be sown in early spring. Sow seed  $\frac{1}{2}$  inch deep in rows  $1\frac{1}{2}$  to 2 feet apart. Thin plants to 10 to 12 inches apart. In the first year, a low-growing plant is produced; in the second year, the plant will develop seed stalks which should be handled similar to the seed heads of anise.

## CHIVES (P)

Chives (*Allium schoenoprasum*) are hardy perennials resembling small green onions with a mild onion-like flavor. They can be grown from seed sown early in the spring or clumps can be divided into 10 or 12 parts and replanted in early spring. The plants should be spaced about a foot apart in the row. For best results, a new row should be planted every 3 or 4 years. The clump can be dug, potted, and grown indoors for winter use.

## CORIANDER (A)

Coriander (*Coriandrum sativum*) is an annual which grows and produces seed in much the same manner as the carrot. Like caraway, the seed is used for flavoring bread and other foods. The plants and fresh seed have an unpleasant scent, but ripe seed is very fragrant.

Coriander seed should be sown thinly in rows which are 2 to 2½ feet apart. Sow in early spring. When the plants are 3 to 4 inches tall, thin to spacings of 18 inches in the row. The plants will grow to heights of 2 to 3 feet. As soon as the first seeds begin to ripen, and before they shatter, dry and separate them as for anise (see page 21). Store the dried seed as suggested for anise.

## DILL (A)



Dill (*Anethum graveolens*) is a fast-growing annual which matures in about 70 days. It is primarily used in making dill pickles. Dill is one of the easiest herbs to grow and is quite hardy, but will not tolerate extreme cold weather.

Seed should be sown in early spring on a well-prepared soil. Sow in rows which are 2 feet apart, and when 5 to 6 inches tall, thin to spacings of 1 foot. Plants will attain a height of 3 feet.

The seed heads, along with a small stem portion, are cut when the seed umbels begin to develop.

## LEMON BALM (P)

Lemon balm (*Melissa officinalis*) grows to about 2 feet and can be propagated by seeds, runners, and by dividing old clumps. It resembles mint in appearance and leaves have a lemon scent and flavor. Grow in full sun to partial shade.

## MINT (P)

Mint (*Mentha spp.*) is a perennial which can be grown in the home garden and attains a height of 1 to 2 feet. Two species are commonly grown: peppermint (*Mentha piperita* - 24 inches tall) and spearmint (*Mentha spicata* - 18 inches tall). Both can be propagated by seeds, cuttings, and division. They prefer a moist soil and will grow in full sun or partial shade. The oil of peppermint is used in flavoring chewing gum, candy, liqueurs, salads, cold drinks, cough medicine, and toothpaste; spearmint oil is used in flavoring chewing gum, jellies, juleps, candy, and tea. Peppermint is more commonly grown for home use.

Mint prefers a deep, rich, open, well-drained humus soil. Runner plants should be set in shallow trenches in the spring, 2 to 3 feet apart. When in full bloom, the plants should be cut and cured like hay. Aromatic flavor is lost and stems become woody upon development of seed. For a constant winter supply, mint can be grown indoors in flower pots.

## PARSLEY (A)

Half a dozen parsley (*Petroselinum crispum*) plants will supply enough garnishes during the summer. Two or 3 plants can be dug, potted, and grown in a lighted basement for winter use.

Sow seeds directly in the garden as soon as the ground can be worked or sow indoors in March, then transplant outdoors. Since the seeds germinate slowly, a few radish seeds can be mixed-in to mark the row. Soak the seeds in warm water for 6 hours before planting to hasten germination.

In addition to parsley varieties good for garnishing, there is a variety called Hamburg that produces a parsnip-like root good for flavoring soups. The roots can also be cooked like carrots. Rows should be 12 to 18 inches apart and plants thinned to 6 inches apart.

## ROSEMARY (A)

Rosemary (*Rosmarinus officinalis*) is a tender perennial shrub which grows to 6 feet in height. A prostrate form (*Rosmarinus officinalis prostrata*) is also available. Rosemary prefers a sunny, moist site and is not hardy in the north. It is propagated by seeds and by cuttings, and is used for seasoning roast, chicken, pork, and biscuits, and as a house plant.

To grow rosemary in northern climates, grow plants in pots containing a well-drained soil to which a sprinkling of lime has been added. Place

the plant outdoors in a sunny, sheltered location during the summer and carry over winter in a cool, light room. When the plant becomes too large, start new plants by making cuttings. This can be done by removing about 6 inches of stem tips and placing the base of the stems in moistened sand or vermiculite. Cuttings root readily in moist sand and should be ready to set out in the spring.

### SAGE (P)

Sage (*Salvia officinalis*) is a perennial which grows to 2½ feet in height and has gray-green leaves and blue flowers. It is relatively easy to grow and prefers a fertile, well-drained soil and full sun. Two varieties are commonly grown: dwarf garden sage (*Salvia officinalis nana* - 6 to 8 inches tall) and golden garden sage (*Salvia officinalis aureus* - 12 inches tall). Golden garden sage is a low, compact variety having gray, green, and gold variegated leaves. Sage is propagated by seeds, cuttings, layers, and root divisions and is used in seasoning stuffing, cheese, sausage, and meats. It is attractive to bees and can be grown as a low hedge.

Seeds should be sown in very early spring or early fall. Also, 3 to 4 inch seedlings can be set out in early spring. Plant in rows 2 to 2½ feet apart with spacings of 12 inches between plants. Do not overwater. Cut back established plants in spring to induce new growth. Renew the planting every 3 to 4 years.

Sage is harvested in late summer by stripping the leaves or cutting the shoots before they bloom. Tie shoots in bunches and hang to dry out of sunlight. Two or 3 cuttings can be made during summer and early fall.

### SUMMER SAVORY (A)

Summer savory (*Satureja hortensis*) grows to about 1½ feet tall, has small dark green leaves and small pink flowers. Sow seed outside in garden soil in early spring in a sunny location and again 1 or 2 months later. Massing plants together furnishes some support to the stems.

### SWEET MARJORAM (A)

Sweet marjoram (*Marjorana hortensis*) is a tender perennial grown for its aromatic leaves. The leaves are used for seasoning soups, egg dishes, salads, and meats. It is sometimes used as an ornamental in rock gardens. Since it is a tender perennial, it will not withstand the cold winters of the central and northern states unless it is well protected.

Sweet marjoram is propagated by seeds, cuttings, and by root division. The small seeds are slow to germinate, and seedlings are very prone to damping-off disease. Sow seed in non-acid soil indoors in early spring; transplant to rows 1½ to 2 feet apart with plants spaced 10 to 12 inches apart in the row. Plants may be dug in early fall and carried indoors for winter use.



### THYME (P)

Thyme (*Thymus vulgaris*) is a perennial which grows to a height of 8 inches. It is grown in much the same way as mint. Many species of thyme are grown for seasoning and as ornamentals. The English and French types are most commonly and widely grown for seasoning. The French type has narrower leaves and small white flowers and is more easily grown from seed than the English type. Thyme is propagated by seed, division, and cuttings and is used for seasoning fish, stews, pork, and for cooking. It is also used in cough and toothache medicines. It prefers full sun and a light, well-drained soil.

Seed should be sown in early spring or earlier indoors in pots. Seedlings should be transplanted to 6 inches apart and thinned finally to 12 to 18 inches apart. The most serious problem in growing thyme is winterkill when grown under wet conditions. Do not overwater. Provide winter protection with evergreen boughs or straw mulch. Dig and divide plants every 2 or 3 years.

Gather leaves just before the plant flowers. Dry them out of sunlight and store in an air-tight receptacle.

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# Vegetable Planting Chart

VEGETABLE	Planting Times*	Weeks from Seeding to Transplanting	Days to Maturity	Depth to plant (inches)	Amount of Seed	Row Length (feet)	In Row Thinning	Between Rows	Estimated Production
<b>Asparagus</b>	April		2 to 3 yrs.	6 to 8	12 plants	20	12 to 18	36 to 50	6 pounds
<b>Beans, Lima</b>	May 20-Jun 1		65 to 90	1 to 2	15 plants	50	3 to 4	18 to 24	4 pounds shelled
<b>Beans, Snap</b>	Apr. 1-20		55 to 75	1 to 1 1/2	15 plants	25	2 to 3	18 to 24	25 pounds
<b>Beets</b>	Mar. 20-Apr. 20		60 to 80	1/2 to 1	12 plants	25	2 to 3	18 to 24	10 pounds
<b>Bocconcini</b>	Mar. 20-Apr. 20		55 to 75	1/2 to 1	12 plants	25	2 to 3	18 to 24	10 pounds
<b>Broccoli Sprouts</b>	Apr. 1-20, Jun. 20-30		90 to 95	(plants)	15 plants	12	18 to 24	30	6 pounds
<b>Cabbage</b>	Apr. 1-20, Jun. 20-30		65 to 100	(plants)	6 plants	25	18 to 24	24 to 30	6 heads
<b>Carrots</b>	Apr. 1-10		60 to 85	1/2 to 1	5 plants	15	1 to 2	18 to 24	15 pounds
<b>Cauliflower</b>	Apr. 1-20, Jun. 20-30		60 to 95	(plants)	5 plants	10	2 to 3	30	5 heads
<b>Chard</b>	Apr. 1-20		70 to 90	1/2 to 1	1/2 pkt.	12	4 to 6	18 to 24	30 pounds
<b>Chinese Cabbage</b>	Apr. 20-May 20		110 to 120	(plants)	1/2 pkt.	10	4 to 6	18 to 24	30 pounds
<b>Chives</b>	Jun. 20-Jul. 30		70 to 85	(plants)	1/2 pkt.	10	12	24 to 30	12 heads
<b>Collards</b>	Apr. 1-20		75	1/2 to 1	1/2 pkt.	25	6 to 8	18 to 24	20 pounds
<b>Cucumbers</b>	May 20-Jun. 20		50 to 70	1 to 2	1/2 pkt.	10	12	48 to 72	6 pounds
<b>Endive</b>	Mar. 20-Jun. 1		70 to 90	(plants)	3 plants	6	24 to 30	24 to 30	12 fruits
<b>English Peas</b>	Mar. 20-Apr. 20		60 to 100	1/2	10 plants	6	8 to 12	12 to 18	10 heads
<b>Garlic</b>	Mar. 20-Apr. 20		115	1/2	4 cloves	3	3 to 15	12 to 18	4 bulbs
<b>Kale</b>	Jun. 20-Jul. 30		55 to 80	1/2 to 1	4 plants	10	6 to 15	12 to 18	4 plants
<b>Leeks</b>	Mar. 20-Apr. 20		130 to 150	1/2 to 1	24 plants	12	18 to 24	18 to 24	24 stems
<b>Lettuce (head)</b>	Mar. 20-Apr. 20		70 to 85	1/2 to 1	18 plants	10	2 to 3	12 to 18	30
<b>Lettuce (leaf)</b>	Mar. 20-Apr. 20, July		45 to 55	1/2 to 1	18 plants	15	8 to 15	18 to 24	15 heads
<b>Mustard</b>	May 20-Jun. 1		80 to 90	(plants)	5 plants	25	36 to 48	48 to 60	18 fruits
<b>Onion (sets)</b>	May 20-Jun. 1		35 to 45	1/2	1/2 pkt.	10	6 to 8	18 to 24	5 pounds
<b>Onion (sets)</b>	May 20-Jun. 1		50 to 60	1 to 2	1/2 pkt.	8	12 to 15	24 to 30	5 pounds
<b>Onion (sets)</b>	Mar. 20-Apr. 20		90	1/2	1/2 pkt.	10	2 to 3	12 to 18	25 pounds
<b>Onion (sets)</b>	Mar. 20-Apr. 10		105 to 115	(plants)	120	30	2 to 3	12 to 18	25 pounds
<b>Onion (sets)</b>	Mar. 20-Apr. 10		105 to 130	1/2	1 pkt.	30	2 to 3	12 to 18	25 pounds
<b>Parsnips</b>	Apr. 1-20		100 to 120	1/2	1/2 pkt.	15	3 to 4	18 to 24	15 pounds
<b>Peas</b>	Apr. 20-May 15		50 to 80	1 to 2	6 plants	10	6 to 8	18 to 24	8 pounds
<b>Peas</b>	Apr. 20-May 15		50 to 80	1 to 2	6 plants	10	6 to 8	18 to 24	8 pounds
<b>Peas</b>	Apr. 20-May 15		50 to 80	1 to 2	6 plants	10	6 to 8	18 to 24	8 pounds
<b>Pop Corn</b>	May 20-Jun. 1		90 to 120	4	5 pounds	25-2 rows	10 to 12	30 to 36	1 peck
<b>Potatoes</b>	Apr. 20-Jun. 1		100 to 120	(plants)	50 plants	50	10 to 12	24 to 30	50 pounds
<b>Potatoes, Sweet</b>	May 20-Jun. 1		100 to 120	1/2	1/2 pkt.	3 hills	36 to 48	60 to 96	30 pounds
<b>Radishes</b>	Mar. 20-Apr. 20, July		25 to 30	1/2	1 pkt.	12	1 to 2	6 to 12	8 pounds
<b>Radishes</b>	Mar. 20-Apr. 30		1 to 2 yrs.	(plants)	3 plants	5	36 to 48	48 to 72	6 pounds
<b>Spinach</b>	Apr. 1-20		120	1/2	5 plants	8	4 to 6	18 to 24	15 pounds
<b>Spinach</b>	Apr. 1-20		120	1/2	5 plants	8	4 to 6	18 to 24	15 pounds
<b>Squash (Summer)</b>	May 20-Jun. 1		40 to 60	1/2 to 1	1/2 ounce	3	3 to 6	12 to 18	5 pounds
<b>Squash (Winter)</b>	May 20-Jun. 1		40 to 60	1 to 1 1/2	1/2 pkt.	2 hills	36 to 48	36 to 48	24 fruits
<b>Sweet Corn</b>	May 20-Jun. 1		60 to 90	2 to 2 1/2	1/2 ounce	20-2 rows	10 to 12	30 to 36	40 ears
<b>Sweet Corn</b>	Apr. 1-20		50 to 60	1/2	1/2 pkt.	8	6 to 8	18 to 24	7 pounds
<b>Tomatoes</b>	May 20-Jun. 1		60 to 90	(plants)	10 plants	40	24 to 36	36 to 48	3 bushel
<b>Tomatoes</b>	May 20-Jun. 1		60 to 90	(plants)	10 plants	40	24 to 36	36 to 48	3 bushel
<b>Watermelons</b>	May 20-Jun. 1		85 to 95	(plants)	6 plants	50	72 to 96	72 to 96	18 fruit

\* Planting times are based on conditions at East Lansing. Change these times to suit your location. When two dates are given for crops that are normally transplanted, the first date is for seeding in the greenhouse.