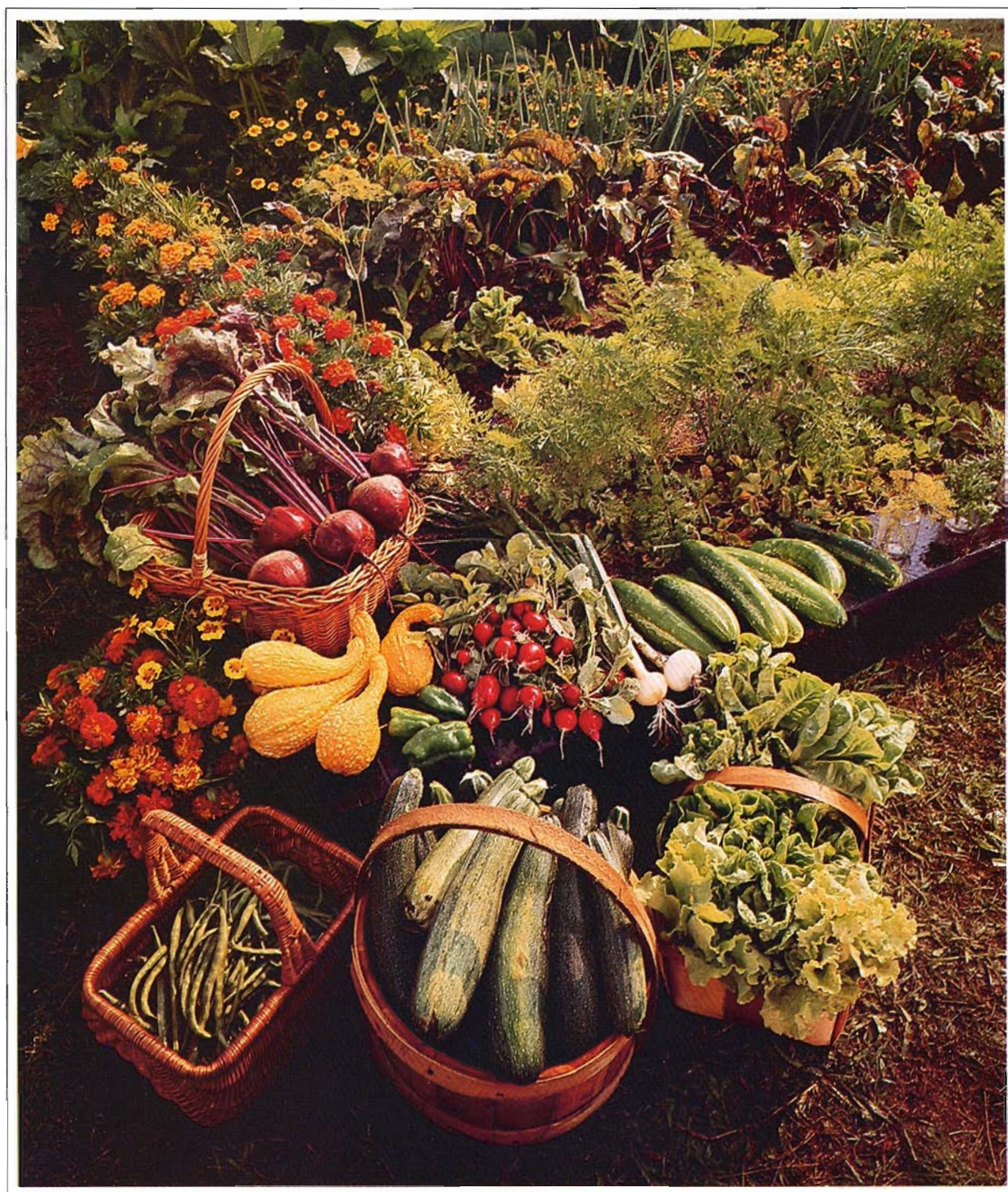


The Home Vegetable Garden

LEONARD D. TOPOLESKI



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The Home Vegetable Garden

CONSIDERATIONS

Where to have a garden. Vegetables thrive in full sunlight and need at least 5 or 6 hours during the middle of the day. Excessive shading results in spindly plants and poor yields.

If possible, the garden should be reasonably near the house so that the gardener can work in it at odd moments. It should be an area that is or can be fenced conveniently to protect it from livestock, woodchucks, rabbits, and children.

Soils. Soils for vegetables should be friable and porous for quick water drainage, crop root penetration, and good aeration. A deep, fine sandy loam or silt loam is best. But the home owner who has little choice of site can grow many vegetables on relatively poor soils if the soils are properly conditioned.

An area that is composed of "fill dirt" is difficult to reclaim for a vegetable garden. A fill area usually consists of a high percentage of bottom subsoil (clay), stones, and debris. The fertility is usually very poor. It requires time, fertilizer, and a considerable amount of energy to make a fill soil productive. Low and wet spots should also be avoided. If, after a moderate shower, water remains in puddles on the soil surface for several hours, the site should not be used for vegetables. Very few vegetables can stand "wet feet" for long periods. However, some heavy soils can be

improved and used for vegetables, but they are difficult to handle and must not be worked when they are too wet.

Sandy soils are satisfactory for vegetables in years with average rainfall, but supplemental irrigation may be necessary in dry periods. Organic matter added to these soils will improve their water-holding capacity.

Equipment. Every gardener needs a hoe, an iron rake, a spading fork,

and a spade or round-pointed shovel. Two or more stakes and a heavy cord twice as long as the garden help in making straight rows. For large gardens, a good wheel hoe or hand cultivator multiplies a gardener's efficiency.

Small garden tractors save labor in soil preparation and cultivation. They are economical to use in working large gardens. A tractor might interest the young people of the family in the garden. The slow-turning (90 to 150 rpm), rotary



Basic gardening equipment: spading fork, rake, hoe, two wooden stakes and heavy cord or rope, 2-quart measuring jar, black plastic mulch, hand trowel, small sprayer or duster. A round-pointed shovel is indispensable (not shown).

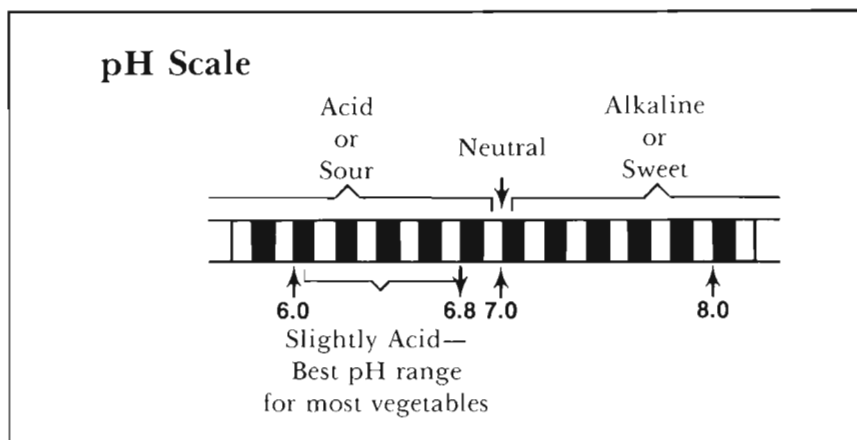
tiller type of garden tractor with an approximately 3-horsepower motor has proved satisfactory on very stony soils.

Gardening is easiest when all tools are clean and well sharpened. Tools last longer if kept rust free. Clean rusted tools with a rust-remover paste or with steel wool. Keep all tools rust free by wiping with an oily rag and putting them under cover when not in use.

Lime and pH. A pH test may be necessary if the garden is in a new location. The symbol pH and figures accompanying it indicate the soil reaction. A soil with a pH of 7.0 is *neutral*; one with a pH of 7.1 or above is alkaline or sweet. Most vegetables grow best on a slightly acid soil where the pH is between 6.0 and 6.8.

Lime should be used on the garden only when a test has been made and the soil is too acid. If the pH is between 5.5 and 6.0, use 3 pounds of ground limestone to each 100 square feet of garden on sandy soils or 5 pounds on heavy soils. The application can be made before or after plowing or spading. If the pH is between 5.0 and 5.5, apply the amounts given above before plowing; and make another application of the same amount after plowing but before raking or harrowing. If the pH is 4.9 or below, double the recommendation for the 5.0 to 5.5 range.

Many soil test kits for the amateur gardener are advertised in magazines. These kits are expensive and are not essential for a good garden. The nutritional requirements of a garden will be satisfied if the recommended amount of commercial fertilizer is applied each year.



Commercial fertilizers. Commercial fertilizers are applied to increase the nitrogen, phosphorus, and potash content of the soil. A 5-10-10 fertilizer contains 5 percent nitrogen, 10 percent phosphoric acid, and 10 percent potash.

A 5-10-5, 5-10-10 fertilizer, or one of a similar analysis should be used at the rate of 4 or 5 pounds to each 100 square feet of garden area. On soils that have been well fertilized for many years, 1 to 2 pounds of 5-10-10 or 10-10-10 may give the best results, if the pH is in the 6.0-6.8 range. On sandy soils, fertilizer is likely to give best results if part of it is broadcast after plowing or spading and the remaining portion sidedressed during the growing season. On loams and clays, results are likely to be best if one-half of the fertilizer is broadcast just before spring plowing. The other half can be broadcast after plowing or applied in bands near the row or around such plants as tomatoes. Not more than 3 pounds of fertilizer should be used in bands to each 100 feet of row, and the bands should be 2 to 4 inches away from the row and at least 2 inches below the surface. Young seedlings can be injured if bands are placed closer to the row and fertilizer in excess of the recommended quantity used. Banding fertilizer by hand is slow and difficult.

Organic matter. Organic matter is important in all soils. Besides in-

creasing the water-holding capacity of sandy soils and making them more workable, it renders heavy soils looser and easier to work, reduces soil compaction, improves their ability to take up water rapidly, and improves drainage. Organic matter also improves soil aeration and tends to make soils warm up earlier in the spring.

Farm manure. The primary function of manure, green manure, and compost is to supply organic matter. Farm manure can supply the bulk of the fertilizer elements (nitrogen, phosphoric acid, and potash) if it is supplemented with 1 or 1½ pounds of superphosphate to each bushel of manure, which is enough for 50 to 75 square feet of garden area. This rate equals approximately 1000 pounds of superphosphate and 20 tons of manure to the acre. Unless manure is well rotted, it should be applied before plowing or spading and then turned under. Poultry, sheep, and goat manure should be used at the rate of no more than 1 bushel to 100 square feet of garden.

Green manure and cover crops. The organic matter in the soil can be increased, and erosion and leaching can be reduced by the use of an overwintering, green-manure crop, preferably rye or ryegrass.

Sow rye when a garden crop has been harvested and it is too late to grow another. Broadcast rye between

the rows of late vegetables slightly before the first killing fall frost. Rye is seeded at the rate of 2 or 3 pounds to 1000 square feet. Stir the seed into the soil with a rake, hand cultivator, or harrow. Rye should be plowed or spaded under early in the spring. Ryegrass is an excellent soil-improving crop and provides organic matter. In most areas of New York, ryegrass must be sown in early August to allow the grass to become established before winter. Since it is slow in germinating and slow growing in the early stages, it can be planted in the garden without competing with the vegetables. In the fall when all vegetables are mature, the ryegrass under cool temperatures will make maximum growth. In the spring, the ryegrass is turned under. Ryegrass is seeded at the rate of ½ pound to 1000 square feet.

Compost. Compost is a good source of organic matter for the home garden. A compost pile can be made of leaves, weeds, straw, waste hay, and any waste vegetable matter other than diseased parts of vegetables. Pile these materials together as they accumulate, keeping the light materials, such as leaves, from blowing away by throwing a little soil over the pile. Each spring start a new pile. Turn the old one over several times during the year to insure even decay; it will be ready to apply to the garden before spring plowing the second year. A leaf compost can, however, be used for a mulch the first spring after the pile is built, or it can be put directly on the garden and turned under the first year.

Mix a cupful of agricultural lime and one of a complete commercial fertilizer, such as 5-10-5, or a forkful of manure with each bushel of compost to hasten decay and to make it a more valuable material. It is not necessary to add special bacteria or fertilizers.

If equal layers of soil and com-

posting materials are used and if the pile is turned 2 or 3 times during the season, it will make good potting or plant-growing soil for use during the winter.

Ashes. Ashes from hard or anthracite coal—a rare commodity in New York—are a partial substitute for organic matter, but have little value as fertilizer. They are used primarily to lighten heavy soils. Applied to a depth of 2 inches or more and thoroughly worked in, they make a marked immediate improvement in the soil.

Wood ashes have the same effect on soil acidity as does lime and should not be applied to the home garden in large quantities unless the soil is definitely known to be acid. To correct an acid soil, use wood ashes at approximately double the rates suggested for lime (p. 4).

PLANNING THE GARDEN

Choosing the crops. The home gardener should choose those vegetables which the family likes best. Some vegetables—celery is a good example—are difficult to grow. Usually, better quality celery can be purchased at the grocery store.

The more perishable vegetables like sweet corn, peas, snap beans, broccoli, and asparagus should receive first consideration in the home garden. These vegetables, when freshly harvested, have a flavor seldom found in grocery store produce.

Space is another consideration. A small space will provide vegetables for many meals if it is planted with such crops as tomatoes, snap beans, summer squash, broccoli, or cabbage. Corn, peas, winter squash, and melons require more space in relation to the amount they produce.

The inexperienced gardener should grow fewer crops and select those that are easy to grow. Corn, snap beans, peas, tomatoes, and squash are good for beginners. Broccoli, cabbage, cucumbers, and melons are somewhat more difficult because of their requirements for disease and insect control; the small-seeded crops such as beets and carrots are more difficult to get started.

The garden can be planted at one time, or the gardener can make a succession of plantings. One planting will give a long harvest of tomatoes, peppers, summer squash, beets, carrots, broccoli, and cucumbers. If sweet corn is planted at one time, it must include several varieties with a spread of maturity. Such crops as summer squash, broccoli, and cucumber must be kept picked in order for them to continue to bear. On the other hand, a single planting of some crops will produce for only a short time even if more than one variety is used. Radishes, head lettuce, and peas fall in this category. An intermediate group in which 2 or 3 plantings may be needed to insure a long season are cabbage, snap beans, and leaf lettuce. If the family is going on an extended vacation, crops that have a short harvest period should be avoided or else planted to mature before or after the vacation. It is especially handy to have growing in the garden the vegetables that are used frequently in cooking or in salads such as tomatoes, peppers, parsley, and chives.

Even an experienced gardener needs a plan on paper. It can be only a list of the crops to be grown with the number of rows, the distance between rows, and the planting dates for each vegetable; or it can be a detailed map of the garden drawn to scale.

With information on how to do it, even a beginner can plan his or her own garden by keeping the following points in mind.

Common commercial containers for starting individual transplants.



pollinated, be able to determine when the seed is mature, and know the methods of removing and cleaning seed from the plant or fruit. Immature and (or) poorly dried and cured seed will result in moldy, inviable seed. In addition, a number of different diseases can be carried by the seed. On the other hand, saving your own seed from an "old family variety," which is not commercially available, is the exception to the rule.

1. Group the crops according to height to prevent shading.
2. The garden rows can be either east and west or north and south. If they run east and west, plant the tall-growing crops on the north side of the garden so that they do not shade the small ones.
3. If the garden is on a hillside, run the rows across the slope, not up and down it. This helps to hold moisture and reduce erosion.
4. Group together the small-growing, quick-maturing crops.
5. Productivity of a small garden can be increased by succession planting. Remove refuse of early-maturing crops and make a second application of fertilizer before the second planting.
6. Practice crop rotation if possible. Rotation should be by families as well as by individual crops.

time to last through the entire season.

Storing surplus seed. Very often a small seed packet contains more seed than space allows to plant. What becomes of the surplus seed?

Seed can be stored for several years in an atmosphere of low relative humidity, 45 percent or less, and a moderately cool temperature, 40° to 50°F. The average household basement or kitchen is less than ideal. However if the seed packets are sealed immediately after the desired amount of seed is planted and placed in a large jar or coffee can with airtight lids, the seed will remain viable for several years. Seed with short storage life, 2 years or less, include corn, salsify, onion, and parsnip. Bean, carrot, leek, and pea seed remain viable for approximately 2 to 3 years; beet, swiss chard, pepper, broccoli, cabbage, lettuce, cucumber, eggplant, muskmelon, radish, spinach, squash, and watermelon will remain viable for 3 to 5 years.

If the seed is old or poorly stored (warm, moist conditions), it is advisable to conduct a germination test or sow the seed much heavier than normal.

Saving seed from the garden. Saving seed from the current year's crop is not a recommended practice. To be successful in this endeavor, the gardener must know the variety, whether hybrid or open

Selecting varieties. The selection of vegetable varieties is a difficult problem. Seed catalogs are colorful and profusely illustrated. The written description of each variety convinces the gardener that it must be included in the garden. Since it is impossible to grow every variety, following these rules will aid in your selection.

Buy vegetable seeds and transplants by variety name. Varieties differ so much in the time of maturity, in quality, and in disease resistance that success or failure in your garden may be determined by the choice of variety.

The best means of disease control in the home garden is through the use of disease and insect resistant varieties; these varieties should be bought whenever possible. Purchase your seed and transplants from a reputable firm. The list of varieties on page 30 is suggested as a starting point for the home gardener. These varieties are chosen for their high quality, dependability, resistance to disease, and adaptability. Try new varieties on a limited scale until they prove to be better than the ones you have been growing.

Transplants. A desirable transplant is stocky, medium sized, relatively young, and free of disease or pests. For most vegetables, a good transplant has 4 to 8 true leaves; and for fruit-type crops, such as tomatoes, it is better not to have flowers on the plant. For the vine crops, the 2 to 3 true leaf stage is better than a

SEEDS AND PLANTS

Buying seed. The quality of seed varies, but New York seed laws protect the gardener fairly well against poor seed and misrepresentation. The kind, variety, percentage of germination, and date of testing are marked on every package offered for sale. A general guide to the quantities of seed to buy is given on page 30. Buy enough seed at one

later stage. Transplants of this group must have a block of soil with their roots. This can be assured by using bands or peat pots.

If suitable transplants are available from a local supply store or greenhouse, it is advisable for the home gardener to buy them. But if particular varieties are not available, the gardener may be required to grow his or her own.

For satisfactory plant growing, it is necessary to provide fertile, disease-free soil or plant-growing medium, suitable containers, proper moisture and temperature, and, above all, proper light. The project requires attention at least once a day and sometimes oftener. It takes expensive equipment to provide sufficient artificial light; so a location must be found that will provide adequate sunlight to the seedlings. Small plastic- or glass-covered, heated outdoor beds are best, though good results are often obtained in picture windows with a southern exposure.

Soil used to grow transplants should be sterilized. This can be done easily if only small amounts are involved. Placing the flats of soil in an oven at 160°–170°F for 30 minutes on 2 successive days will kill most disease organisms.

Suitable artificial-soil mixes are available from garden stores or seed houses. These mixes are disease, insect, and weed free. In addition they are lightweight and easy to handle. A mix should be spread in flats or shallow wooden boxes about 2½ inches deep and thoroughly watered. An alternative is to place bands or peat pots in the boxes first and fill these. Place 2 seeds at 2-inch intervals each way and then cover with an additional ½–¾ inch of mix. Water again and place containers in a warm location (60°F nights and 70°–75°F days) for the germination period. Add water as needed to maintain good moisture in the mix, but avoid continued saturation. Since frequent watering may increase disease hazard, water thoroughly each time. After plants



Large-seeded vegetables can be sown to the approximate distance in the row by hand. This is very difficult to do with small seed.

have 2 or 3 true leaves, daily watering may be needed.

When seedlings start the first true leaf (3rd leaf), thin to one plant per spot to give an average spacing of 4 square inches per plant. Maintain the temperatures suggested for germination until a few days before setting the plants in the garden and exposing them to outdoor conditions. Under this procedure tomato plants should be ready for the garden in 5 to 6 weeks, peppers and eggplant in 6 or 7 weeks, cabbage and similar crops in 4 or 5 weeks, and melons and other vine crops in 2 or 3 weeks. Onions, which should be seeded and grown much more thickly than the others, take 5 to 6 weeks.

If the plants develop a pale green or yellowish color, they may be deficient in nitrogen. This can be corrected by adding a tablespoonful of soluble complete fertilizer per gallon of water for one watering. In case the plants cannot be set out in the garden at the expected date, they can be held back by reducing the application of water.

PREPARING THE SOIL FOR PLANTING

Plowing or spading. Fall plowing of most New York gardens is not recommended. The ground should be turned over in the spring just as

soon as it is dry enough to work. A good test is to mold a handful of the soil into a ball. If the ball is not sticky and crumbles readily when pressed with the thumb, the soil is ready to be worked. Suggestions on applying part of the fertilizer before plowing are given on page 4. Plow or spade the soil to a depth of 8 inches.

Fitting the soil. Harrow or rake spring-plowed or spaded soil soon after turning to break up the clods and to prevent excessive drying. A final raking may be necessary just before seeding. For the small-seeded crops, such as carrots, a well-pulverized surface insures easier planting, better germination, and a more even stand. Large-seeded and transplanted crops need less tillage.

Planting and care. The garden can be planted over a period of 3 to 4 months, depending on the length of the growing season. Spinach, peas, onions, and lettuce will do best if planted as early as the soil can be worked. Tomatoes and other tender plants should not be set out until the danger of frost is past. Plantings of cabbage, cauliflower, broccoli, Chinese cabbage, turnips, and so forth for fall harvest should be made in late June or early July (table 1).

Marking rows. A heavy cord stretched tightly between stakes

*A hill of sweet corn.
A hill is a cluster
of plants—not a
physical mound
of soil.*



makes it easy to mark a straight row. To open furrows for large seeds, walk backward, stepping on the cord to hold it in place, and drag the tilted blade of the hoe along the string. For small seeds, drag the hoe handle along the string in short strokes, as in sweeping.

Row spacing. Rows are designed for convenience in planting, cultivating, and harvesting. If they are too closely spaced, competition between plants and with weeds for water, plant nutrients, and sunlight is intensified, and harvesting becomes difficult. Suitable row spacings are given in table 2. Standard 3- and 6-foot row spacings are the most convenient if small power tools are used.

Sowing the seed. Seeds should be sown a little thicker than the plants will finally stand to allow for those that fail to grow or that may be killed when they are very young. Space the seed uniformly. Heavy seeding wastes seed and time in thinning the plants.

Drills or hills. A *drill* is a row of single plants spaced more or less evenly. A *hill* is a cluster of plants, not a mound of soil. Mounds are not recommended as mounded soil dries out more quickly than level soil.

Depth to plant. Cover the large seeds such as corn, peas, and beans with 1 to 2 inches of soil and all small seeds such as carrots, lettuce, and the like with $\frac{1}{4}$ to $\frac{1}{2}$ inch of soil.

A general rule is to plant shallow in early spring, especially on heavy soils. In warmer weather and on lighter soils, deeper seeding is usually advisable. In covering the seed, provide good contact between the soil and seed by gently firming the soil over the seed. Some additional loose soil can be pulled over the row to leave a slight ridge. In hot, dry weather when the soil around

Table 1. Seasonal Planting Guide

Early Spring Late March, April, Early May	Mid-Spring Mid-May, Early June (after frost)	Early Summer Mid-June, Early July	Midsummer Mid-July, Early August
Peas Onions Lettuce Radish Spinach Turnip Rhubarb Parsley Endive	Snap beans Sweet corn Chard Cucumbers Tomatoes Eggplant Peppers Parsnip	Snap beans Sweet corn Chinese cabbage Celery Brussels sprouts Cabbage Carrots Parsley Rutabagas	Head lettuce Beets Peas Collards Endive Kohlrabi
Asparagus Broccoli Beets Cauliflower Brussels sprouts Early potatoes Salsify	Winter squash Summer squash Dill New Zealand spinach Fall potatoes Muskmelons Watermelons Lima beans	Broccoli Cauliflower Beets Kale	Leaf lettuce Spinach Mustard Radish

This table shows preferred planting periods for vegetables. In each column the top group of crops usually should or may be seeded in the early part of the period. The lower groups are planted a week or so later.

Table 2. Minimum Distance between Rows

12-18 inches	18-24 inches	30-36 inches	60-72 inches or more
Beets Carrots Endive Kohlrabi Lettuce Onions Parsley Parsnips Radishes Salsify Spinach Turnips	Beans (snap) Celery Chard Chinese cabbage Kale Peas Peppers Rutabagas	Beans (Lima) Broccoli Brussels sprouts Cabbage Cauliflower Corn Eggplant Peas (tall var.) Potatoes Tomatoes (staked)	Asparagus, 5-6 ft Cucumbers, 4-6 ft Melons, 5-6 ft Rhubarb, 4-5 ft Summer squash, 4-6 ft Tomatoes (not staked), 3-5 ft Winter squash, 6-8 ft

the seed dries out quickly, frequent light watering will help germination. Another possibility is to shade the row until the young plants start to push through the soil. This can be done with boards or papers held in place with stones or soil.

Thinning. Remove surplus plants before they can compete with those that are to remain. The total yield is likely to be much greater if thinning is done early than if it is done only by removing those that are large enough to eat.

Transplanting. Water plants in flats or market packs an hour or more before transplanting. Keep a block of soil around the roots and set out the plants as soon as they have been removed from the container. The holes for the plants should be dug slightly larger than the blocks of soil around the roots. The plants should be set slightly deeper than they were in the original containers. After firming the soil around the roots, pour a cup of water or transplanting solution into the hole around each plant. Finish filling the hole with loose soil.

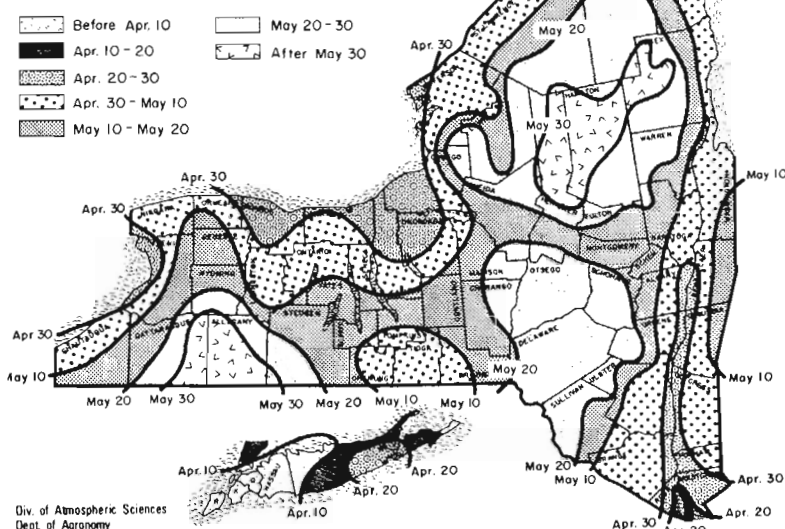
Fertilizer added to the transplanting water often gives quicker recovery than does plain water. A commercially prepared transplanting or starter fertilizer is recommended. A transplanting solution can be made by mixing 1 cupful of 5-10-10 or similar fertilizer to 12 quarts of water.

Hot-caps and hot-tents. Plant protectors (hot-caps, hot-tents) are usually made of wax paper and serve as miniature cold frames. They are used early in the spring to start tender plants from seed and to protect very early transplants. Hot-tents are larger than hot-caps and are recommended for the vine crops and tomatoes. Place the caps over the seeded hills or transplants as soon as seeding or transplanting is done. Cover the flanges at the bot-

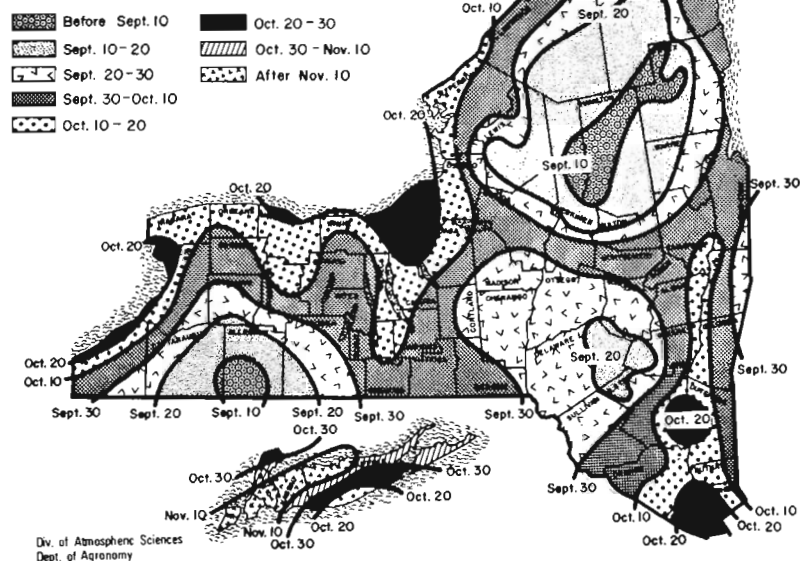


Hot-tents provide protection against late spring frost and allow earlier spring planting.

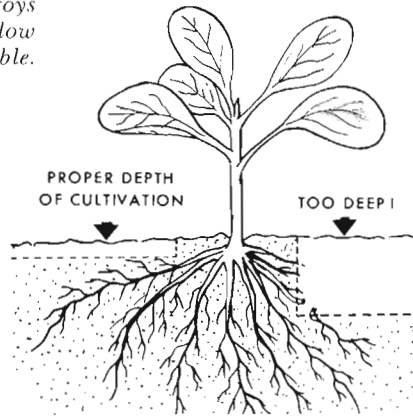
Average Dates of Last Occurrence of 32° in Spring



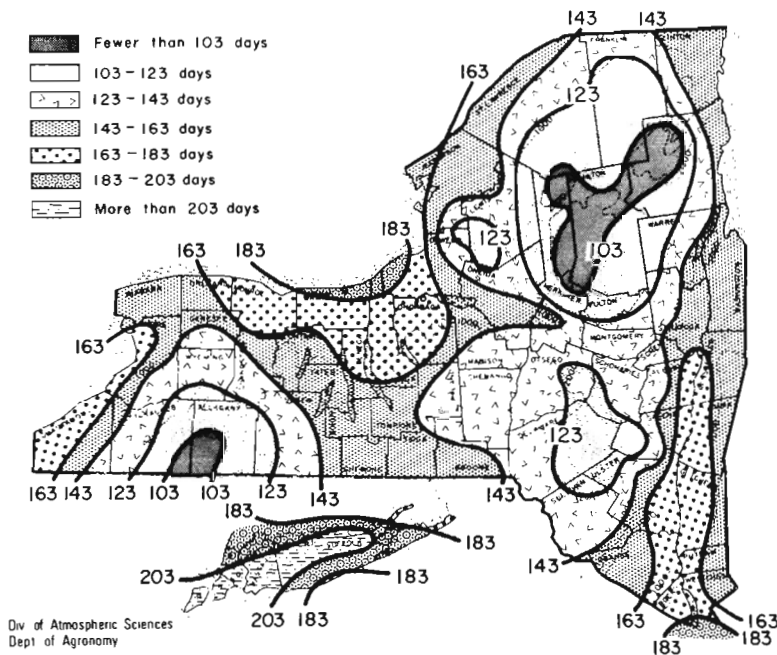
Average Dates of First Occurrence of 32° in Fall



Deep cultivation destroys necessary roots. Shallow cultivation is preferable.



Average Length of the Freeze-free Season in Days



Div. of Atmospheric Sciences
Dept. of Agronomy

tom of the cap with soil to hold them in place. Cut a small slit a half inch or so on the south side of the protector to provide ventilation. After the danger of frost has passed, open the cap gradually to harden the plant. First make a small hole in the top or raise one side of the cap and enlarge that opening. The entire cap can be removed about a week later.

Irrigation. Irrigation is seldom needed in home gardens in New York State, but in some years additional water during periods of drought

may improve the quality and yields of summer vegetables. Moisture will more likely be a limiting factor on sandy or shallow soils than on heavy or deep soils.

Irrigation may prove beneficial when there has been no soaking rain (approximately 1 inch) for 10 to 14 days. If water must be carried in a pail, it may pay to water only recently transplanted vegetables. But a gardener who has a hose and adequate water pressure may find that it pays to water the entire garden once every week during dry periods.

When irrigating, apply enough water to soak loamy soil to a depth of 5 to 6 inches and sandy soil to 10 to 12 inches. This takes approximately $\frac{2}{3}$ gallon of water to each square foot of garden or about 65 gallons for 100 square feet. With sprinklers the amount of water applied can be determined by placing 4 or 5 straight-sided cans in the area being watered. One inch of water equals 1 inch of rain.

Furrow irrigation, running the water down small furrows between rows, is possible if the garden is nearly level or has a uniform slope.

Cultivation and weed control. Weeds can be the gardener's worst enemy. They compete for moisture and nutrients and may harbor insects and diseases. They shade the plants and interfere with air circulation. Tall weeds may retard the evaporation of dew and rain from the foliage; and thus, during periods of excess moisture, they may increase the incidence of infection by bacteria and fungi.

Weeds can be controlled by hand weeding, cultivation, mulches, chemicals (herbicides), or a combination of these methods.

A single shallow cultivation is less injurious to crop roots than a deep cultivation and is just as efficient in controlling weeds. A wheel hoe with weed knives is one of the most efficient and useful tools for the home garden. A hoe is the next best hand tool for weed control.

Mulches. An organic mulch is especially desirable on light sandy soils and on cool-season crops. Organic mulches keep the soil several degrees cooler than bare soil or soil covered with black plastic mulch. Mulches reduce heat radiation from the soil, increasing the chance of frost damage on a cool night. Organic mulches are best applied after the soil has become warm and as soon as the crop plants are large enough for them not to be buried

by the material. It is usually put on just after the first cultivation.

Weed growth can be controlled by the use of mulches. Mulches also tend to conserve soil moisture, prevent erosion, do away with root damage caused by deep cultivation or hoeing, and keep the fruits of such crops as tomatoes, cucumbers, and melons clean. Straw, old hay or grass, leaves, sawdust, and wood shavings are the most common organic materials.

Sawdust can be used as a garden mulch when the vegetables are 2 to 3 inches high. Weeds should be removed before the sawdust is applied; any weeds that remain in the soil will grow through the sawdust, but they can be easily removed by hand.

Apply 1-1½-inch layer of sawdust over the entire garden. Approximately 1 cubic yard of sawdust will provide 1 inch of mulch over 324 square feet of area. About 4 cubic yards are needed for a garden 30 feet wide and 40 feet long. A garden 50×50 feet will require about 8 cubic yards.

Wood shavings, fine wood chips (do not use coarse wood chips), and peat moss can be used in the same manner and quantity as sawdust. Apply these materials when the young plants have become established and are several inches tall.

Old straw or hay that is free from weed seed is ideal. Straw mulch is applied like sawdust. A 3- to 6-inch layer of straw or hay is required, whereas a 1- or 2-inch layer of peat moss, grass clippings, composted leaves, or sawdust is enough.

If a large quantity of organic mulch is plowed under or worked into the soil, it may cause a temporary shortage of nitrogen so that the crops become yellow. This shortage can be prevented by adding approximately 1 pound of nitrate of soda or ½ pound of ammonium nitrate or ¾ pound of ammonium sulfate to each bushel of sawdust.

Leaves make an excellent, economical mulch if gathered in the



A wheel hoe cultivator with adjustable knives is an efficient method of controlling weeds.

fall into flat-topped piles so that they become thoroughly soaked with rain and melted snow during winter and spring.

Black plastics. Black or very dark plastics, usually made of polyethylene, have proved effective in hastening maturity as well as in controlling weeds. They frequently increase the yield of the warm-season crops such as melons, peppers, eggplants, and tomatoes and may increase the yield of all early planted crops. During the day, the dark plastic absorbs more of the sun's heat than do organic mulches and, at night, radiates the heat back faster. Thus, plants mulched with plastics are somewhat less liable to frost injury than those mulched with organic mulches.

It is important that the soil be well supplied with water from either a good soaking rain or irrigation a few days before the plastic is laid. It is almost impossible to lay plastic on a windy day. Plastic mulch can be laid immediately after planting, but for most transplanted crops it is much easier to apply it first and plant through it.

First make small furrows with a hoe or the plow of a hand cultiva-

tor about 3 to 4 inches deep with the distance between the furrows slightly less than the width of the plastic. The soil from the furrows should be thrown to the outside so that it will be available for covering the outer edge of the plastic. Do not stretch the plastic tightly, especially in hot weather, since it will shrink upon cooling. It is advisable to anchor the loose end of the plastic with soil before unrolling the remainder of the material. If you are covering a long row, cover the outer edge of the plastic in the furrow with soil as you move along the row. When the plastic has been laid and securely anchored on all sides, holes for the transplants can be punched through the plastic with a hand trowel or bulb planter. After setting the transplants, mound soil around the holes made for the plants to prevent the wind from whipping the plastic loose.

For small-seeded crops that are seeded directly in the row, it is best to plant the seed and then lay the plastic. The plastic can be laid between the rows or directly over the rows. If the plastic is applied directly over a seeded row, anchor it on all sides and then cut the plastic down the middle. Make small furrows approximately 2 inches deep as close to the seeded row as possible without disturbing the seeds. Anchor the plastic in the furrows. Large-seeded crops such as corn, beans, and peas can be planted directly through the plastic.

Black Plastic Mulch



Mark a row and open a furrow 3-4 inches deep.



Gradually unroll plastic and anchor edges in the furrows.



Continue to dig furrows to make a track slightly narrower than the width of the plastic.



At the end of the row, cut plastic off and anchor the loose end.



Anchor the plastic at one end of the row with soil.



Area covered with plastic is now ready for transplanting or direct seeding.

Because of rapid changes in chemical regulations and recommendations, controls in this publication may be outdated. To be sure you are using correct materials and procedures, either know that the intended use is stated on the label or else consult your Cooperative Extension agent or the New York State College of Agriculture and Life Sciences, Cornell University.

Chemical* weed control. Chemicals are sometimes useful for weed control in the home garden. The gardener must be willing to spend considerable time calculating exact dosages, timing, crop tolerances, and so forth before he or she embarks on a control program with chemicals. Used improperly, they may damage the crop or fail to control weeds. Used correctly, they can eliminate many tedious hours of hoeing, cultivating, or hand weeding.

Chemicals are of 2 general types: *preventives*, the more common type, which must be applied to the soil immediately after the existing weeds have been killed by some kind of tillage; and *foliage selectives*, which are sprayed over existing weeds and crop to kill the weeds but which leave the crop unharmed. Only a few foliage selectives have been discovered. They are so specific that a separate chemical is needed for each type of crop. For this reason they are not practical for the average gardener.

Many annual weeds start early in the spring and do not bother plantings made in midsummer. However, some of the most troublesome weeds such as crabgrass, barnyard grass, pussley or purslane, and *Galinsoga* do not sprout until the soil is thoroughly warmed. A preventive-type herbicide controls this group more effectively than does a foliage-selective type applied when the weeds are large.

Dacthal (DCPA) and Treflan (Trifluralin) are two preventive

herbicides that are available to the home gardener. Neither herbicide will totally prevent weed growth nor will they totally eliminate weeds. They are recommended for limited use in conjunction with hoeing and mulching.

Dacthal and Treflan are formulated into a number of different products and sold under several trade names. They are available to the home gardener in the granular form, which is convenient for home garden use. They are also available in small consumer-sized units.

Both herbicides are primarily grass preventives and can be used in the home garden where a wide range of vegetable crops are grown in a relatively small area. However, Dacthal and Treflan cannot be used on all vegetable crops. Dacthal cannot be used to control weeds in carrots, and Treflan should not be used in onions. Neither herbicide should be applied to soil that will be planted to sweet corn, since both chemicals will cause serious stunting of this crop. When employing either chemical, follow the manufacturer's directions on the label. Do not use with crops that are not listed on the manufacturer's label. It is illegal to do so, and crop injury may occur.

Neither herbicide will control weeds that have already emerged nor will they control the annual weeds ragweed, mustard, and *Galinsoga* or the perennial weeds quackgrass and nutsedge.

In using an herbicide, it is recommended that the garden be measured off into given areas, for example, 10 feet × 10 feet, and that the recommended rates of chemical be weighed out for the given area and then applied. This procedure should be followed until the entire garden area has been treated.

The herbicides should be applied to freshly tilled, well-prepared seedbeds. A simple salt-shaker-type applicator can be made from a capped glass jar in which holes are made in the lid. The holes in the lid or cap should be small enough

to allow controlled application of the granular herbicide. Never store the unused portion of the herbicide in the unlabeled shaker jar. Always return the unused herbicide to the original container.

Dacthal is usually applied to the soil after the crops (either seeded or transplanted) have been planted but before the weeds have emerged. Treflan must be applied to the soil and then rototilled or raked into the soil before the vegetables are planted. Rake or rototill the Treflan into the top 2 inches of soil; deeper tillage may result in loss of effectiveness of the herbicide.

If rain does not occur within 2 days after treating the soil with either herbicide, apply ½ inch of irrigation water to the treated area.

The control of perennials such as quackgrass, thistles, and bindweed requires very special practices. As a rule, perennials are best controlled by black plastic mulch (1.5–4 mils thick). Chemicals will work, but most of them can be used only after harvest because they are toxic to almost all vegetables. Chemicals are particularly helpful in preventing the spread of perennials from the edges of the garden.

Most perennials continue to grow well into the late fall. Spraying 2,4-D in gardens in late fall after all crops have been harvested will weaken or kill all broadleaf perennial weeds. However, 2,4-D does not control perennial grasses, for example, quackgrass. Very small amounts of 2,4-D, a potent herbicide, will damage or kill most vegetables, flowers, and trees. Do not spray on windy days.

A sprayer used for 2,4-D cannot be satisfactorily cleaned for other

**This is a simplified list of chemicals. Many additional excellent compounds are available. However, only the hobbyist or commercial grower who doesn't mind the cost and has the time to learn how to use them should attempt to have all these chemicals on hand.*

Spraying or dusting the garden with a dual-purpose spray or dust on a regular schedule will control most diseases and insects.



gardening purposes. Residual 2,4-D in the sprayer will damage plants.

Purchase 2,4-D in small quantities. In storage 2,4-D can vaporize and contaminate stored seeds, fertilizers, and so forth.

Disease and insect control. Home gardeners may be disappointed in their attempts to control diseases if they rely only on spraying or dusting after diseases make their appearance. From seeding time until harvest, diseases and insects may cause losses to vegetables. Successful control requires a 7-10-day dusting or spraying schedule.

Method of application (sprays or dust). To be effective, chemicals must be distributed over all surfaces of a plant. In general, this objective can be achieved better with sprays than with dusts.

Dusting is quicker and more convenient, and many gardeners successfully use this method by frequent and diligent applications. Dust applications made in early morning or late evening, when wind is at a minimum, are more effective than applications made when the plants are dry. Moisture encourages the growth of many pathogens. Apply the chemicals before rainy periods when they are most needed.

Insecticides and fungicides. Numerous insecticides and fungicides are available to the home gardener. The following chemicals will give excellent control of most garden diseases or insects if applied at 7-10-day intervals, and if label dosage recommendations are observed. Labels should also be checked for interval between last application and harvest.

Malathion is generally considered one of the safer insecticides. It is an excellent all-purpose insecticide and controls a wide variety of garden insects, especially sucking insects (aphids). Malathion is available as a dust, a wettable powder, or an emulsifiable liquid.

Carbaryl (Sevin) is one of the safest materials for home gardeners to use. Carbaryl (Sevin) is effective against many of the leaf-feeding caterpillars, leafhoppers, beetles, and worms. However, Sevin is toxic to bees. Avoid the application of Sevin if bees are active in the garden. Spray in the early morning or late evening when bees are not actively foraging.

Maneb (Dithane M-22, Manzate) is an organic fungicide used to

control diseases on a wide range of vegetable crops.

All-purpose mixtures. Many dual home-garden mixtures are presently on the market. When purchasing one of these dual garden sprays or dust mixtures, read the label and be certain that one or more insecticides such as methoxychlor, malathion, or carbaryl (Sevin) plus a fungicide such as zineb, captan, or maneb are included.

An excellent dual garden spray can be formulated easily by mixing the following insecticides and fungicides in 1 gallon of water:

Carbaryl (Sevin) 50WP	2 tbs
Malathion 25WP	4 tbs
Maneb 80WP	2 tbs

Use level tablespoonfuls. A heaping tablespoonful may be equivalent to 2 tablespoons. This may result in injury to the plants. Agitate this spray periodically to keep the chemicals in suspension.

Pesticides are poisonous to humans and wild life. Read the precautions and follow the directions on the label.

Seed treatment. Seed treatment kills disease organisms in or on the seed and prevents seed rot and *damping-off* or rotting of the young seedlings. Treated seed can now be purchased from reputable seed companies. The

gardener can do it easily by adding a small amount of one of the many seed-treating chemicals to the seed packet. The tip of a penknife carries enough. Shake the packet for a few seconds, and the treatment will be completed. Arasan is an excellent material for most garden seeds.

Poor growth and yield. Even the best cared for garden has its problems. Some of these problems are inconsequential, and often they cannot be attributed to any fault of the gardener. An occasional plant may suffer an abnormality or even die from an unknown cause. Adverse weather such as high or low temperature, too much or too little rain, or high winds can cause poor growth, blossom drop, and plant damage.

In many instances, poor soil conditions including improper fertilization, soil compaction, inadequate drainage, poor texture or structure, or undesirable pH are responsible for inadequate growth.

Poor location of the garden, excessive shading or competition from nearby trees, insects, diseases, root pruning caused by deep cultivation, and careless use of herbicides, insecticides, and fungicides are frequently the cause of abnormal plants.

Soil testing may or may not show the reason for poor growth. Perhaps the trouble is simply a lack of adequate fertilizer. A shortage of an essential plant nutrient is likely to reduce the yield of any crop before the deficiency causes visible symptoms. The following descriptions

of the more common nutrient deficiencies should help in their identification and control.

Plants deficient in nitrogen are yellower or paler green than healthy ones. Nitrogen is the most soluble of the common fertilizer nutrients and is usually the first to be leached out of coarse sandy or gravelly soils by excess rain or irrigation. It becomes deficient especially fast on soils that are low in organic matter, since decaying organic matter provides a continuous source of nitrogen during the season. During a cold, wet spring nitrogen may be a limiting factor early in the season even on well-fertilized soils. In cold, wet soil the bacteria act very slowly to change the complex forms of nitrogen in manure, compost, and soil organic matter to the nitrates that the plants can use.

Plants that show signs of nitrogen deficiencies should receive extra nitrogen fertilizer. The easiest way to supply this is to *sidedress* the plants with nitrate of soda or ammonium nitrate. The *sidedressing* is usually done by sprinkling the dry nitrate along the row in a strip a few inches wide and a few inches away from the plants at the rate of 1 ounce of nitrate of soda or ½ ounce of ammonium nitrate to each 5 to 10 feet of row. It should be watered in by sprinkling the garden enough to soak the soil 4 to 5 inches deep. The nitrate can be dissolved in water at the rate of 1 ounce to a gallon, if irrigation is not available, and poured on the soil around the base of the plants, not on the leaves. If nitrate is not avail-

able, a commercial fertilizer can be used at the rate of ¼ cup to 25 feet of row.

Phosphorus-deficient plants usually develop an abnormal reddish purple color. Soils that are too acid (pH below 4.9) often lack phosphorus. The deficiency shows most frequently on corn leaves and on tomato plants at setting time and can be corrected by using a high phosphorus starter solution, such as 10-52-17, or by dissolving 1 ounce of ammo-phos in 1 gallon of water and thoroughly soaking the soil.

Prevention is often better than cure. Phosphorus deficiency can be prevented by using an adequate amount of good commercial fertilizer before planting. A shortage of phosphorus delays crop maturity.

Some plants such as corn, cabbage, and others frequently turn reddish-purple in color after a period of cool weather. Normal color usually returns after a few warm days.

Potash deficiency appears as a yellowing or browning along the tips and edges of the leaves. The oldest leaves are affected first and most seriously. Plants that have had the amount of manure or commercial fertilizer recommended on pages 4-5 are not likely to be deficient in potash. If there is much of the growing season left, potash deficiency can be corrected by the application of an ounce of good complete commercial fertilizer dissolved in a gallon of water, for each 5 feet of row, followed by a good irrigation to get it down to the roots.

Common and Troublesome Weeds in the Vegetable Garden



Ragweed (*Annual*)



Hedge Bindweed (*Perennial*)



Purslane (*Annual*)



Amaranth Pigweed (*Annual*)



Quackgrass (*Perennial*)



Galinsoga (*Annual*)



Chickweed (*Annual*)



Field Bindweed (*Perennial*)



Lambsquarters (*Annual*)



Wild Buckwheat (*Annual*)



Common Mallow (*Annual*)



Crabgrass (*Annual*)

Young asparagus spears (left) at various stages of development.

Flowering rhubarb plants (right). The home gardener has no control over this process. Once flower stalks are noted, they should be removed and discarded.



PERENNIAL CROPS

Asparagus and rhubarb are common vegetables in many home gardens. Since these crops continue to yield over a period of 10–15 years, they should be located at one side or one end of the garden, out of the way of other garden operations.

Asparagus. Asparagus is one of the earliest vegetables in the spring. The superior quality of freshly prepared, homegrown asparagus is a treat that will delight connoisseurs. It grows best on well-drained soils where the pH is above 6.0. The bed or row is usually planted with 1-year-old crowns purchased from local garden stores or seed houses. If crowns are not available, they can be grown from seed in a small nursery. Besides delaying the establishment of the bed for a year, growing the planting stock requires careful attention to seeding and weeding. Chemical weed control is very important if any amount is to be grown. The crowns should be planted as early in the spring as the soil can be worked.

Before working the soil, spread 4 pounds of a complete fertilizer such as 5-10-10 for every 100 feet of row. Work the soil to a depth of 8–10 inches. Dig a trench or furrow 6–8 inches deep. If more than one row is needed, space the trenches 4–5 feet apart. Set the roots 18 inches apart in the middle of the trench

and cover with only 1 or 2 inches of soil at planting time. After the young plants are well above the ground, fill the trench gradually.

Asparagus can be harvested for 2–3 weeks the third season after planting. In the following years the harvest may extend over 4–6 weeks. At the end of the cutting season, give the bed a thorough cultivation and apply 2 pounds of complete fertilizer for every 100 feet of row. Allow all new shoots to grow to fern, which manufactures food that is stored in the crowns for next year's production. The old tops can be removed in late fall or worked into the soil early in the spring.

Harvest the asparagus spears when they are 6–8 inches tall but before the tips begin to separate. In warm weather daily harvest may be desirable, but in cool weather harvesting twice weekly may be sufficient. In harvesting, the spears should be snapped off at the soil level rather than cut. The snapping avoids the danger of cutting other young roots and eliminates some trimming in the kitchen. Any spears above ground at the time of a killing frost will be rendered worthless.

Asparagus loses its quality quickly and should be eaten or processed within a few hours after harvest unless promptly refrigerated.

Rhubarb. Rhubarb, like asparagus, matures in early spring. It is grown for its large, thick leafstalks, or petioles, which are used for sauces

and pie. The bed is usually started with rootstocks or divided crowns from old beds, or planting stock can be purchased. The crowns can be cut into as many pieces as there are strong buds. The rootstocks are usually planted 2–3 feet apart, in rows 4–6 feet apart, and the bud set at ground level. Rhubarb should not be harvested the first year and only a small amount the second year. Later harvests can extend 6–8 weeks each spring.

Before growth starts each spring, add ½ pound of a complete fertilizer for every 25 feet of row and work into the soil with shallow cultivation. If the bed becomes unproductive, check it for root rot. If rot is present, new plants must be established.

In harvesting, the stalks are pulled, not cut. The leaf blades are removed, and *only* the fleshy stem, or petiole, is used. Always leave a few stalks on the plant unless the bed is to be discontinued. After 10 or 15 years, the plants become crowded and the leaf petioles small.

BULB CROPS

The onion is the main bulb crop grown in the home garden. Shallots, leeks, chives, and garlic are quite often grown on a limited scale.

All bulb crops are hardy and can be planted as early as the soil can be worked in the spring. The cultural



Mature, dry shallots (far left) ready to be harvested for fresh use or storage.

*Common garlic (*Allium sativum*, left) bulb and cloves. Great-headed garlic (*Allium ampeloprasum*, right) bulb, clove, and small basal bulblets. The small basal bulblets can be used to distinguish between the two species.*

practices are very similar for all members of this family.

Onions. Early varieties of onions are most productive when grown from transplants (small plants) or from sets (small onion bulbs grown from seed the previous season). Direct seeding is satisfactory for growing green onions or for late varieties. Transplants are used when large bulbs are desired. For example, the large, sweet, Spanish type of mild onions produces a good crop if grown from transplants. Transplants raised commercially can be bought ready to plant, or they can be grown in a greenhouse or cold-frame by seeding in late January or February.

Sets, transplants, or seed for *green onions* can be planted in early spring. Seed can be planted again in early summer. Sow 2-4 seeds per inch of row and 1 inch deep. Plant sets and transplants 1 inch apart in the row about 3 inches deep. Plants are usually harvested when the stem attains a size of $\frac{1}{4}$ inch or more in diameter.

Large dry onions grown from plants are set in shallow furrows $\frac{1}{2}$ inch deep, spaced 3-4 inches apart in the row. Sets for dry onions should be about $\frac{1}{2}$ inch in diameter. Larger sets are likely to go to seed before developing a crop. Sets are planted 1 inch deep with 3-4 inches between sets. Onions will keep well if the necks and skin are allowed to dry thoroughly before harvesting.

The tops should fall over by themselves, and the scales on the bulbs should become dry. Pull green onions only when they are to be used immediately.

Frequently onions grown from sets and transplants flower and go to seed prematurely. This can happen if sets or transplants are too large or the weather is too cool. Relatively low temperatures of 40°-50°F tend to promote seedstalk development. Onions started from seed seldom develop seedstalks prematurely.

Shallots. Shallots are a type of onion. They differ from the common onion in that they produce a cluster of slender underground bulbs from a single bulb, rather than one large bulb.

In early spring, single bulbs are planted 6-8 inches apart in the row with rows 3-4 feet apart. Other cultural practices for shallot are similar to those for onion.

After multiplying and dividing, shallots can be harvested in the green mature stage and used as "green bunching onions," or they can be allowed to mature and used as a substitute for common bulb onion.

Leeks. Leeks are grown from seed or transplants. For transplants, seed is sown in late January or February in a greenhouse, coldframe, or window box. When the seedlings are 6-8 inches high, they can be

planted in the garden. If the weather is unfavorable in early spring, the tops can be cut off to 4 inches and the seedlings held in the starting container until the weather is favorable. Seed is sown directly in the row in the same manner as for green onions. Leeks are usually blanched to give a long white neck. In blanching, the soil is banked gradually around the basal part of the stems as they are growing. If the plants are banked entirely in one operation while young, they will decay.

Leeks are harvested when they reach an edible size, but before the bulbs exceed 1 inch in diameter.

Chives. Chives, unlike the other bulb crops, are grown for their leaves, which are used for seasoning.

Chives can be started in the spring with seed or plant divisions from older clumps. Individual plants grow into a compact mass called clumps or tufts. The leaves can be cut as needed. Chives can be grown in flower beds or for year-round use in larger flower pots.

Garlic. Garlic is a perennial plant in mild regions of the United States. The climatic conditions in most parts of New York dictate that it be grown as an annual.

Garlic can be grown on a wide range of soil types, and the soil type in your garden should be satisfactory for garlic. Heavy clay soils, which tend to compact, may pre-

vent uniform expansion of the bulb.

When is the best time to plant garlic in New York? is still a debatable question. Some New York gardeners have a measure of success when they plant in early October. This allows the cloves to produce some shoot growth and root development. Frequently, cloves planted in November and later do not have sufficient time to develop a root system, and they are found lying on the top of the soil in spring.

Mulching with straw or other coarse mulching materials (do not use leaves as they compact) or mounding soil over the rows will help the plants survive severe winter conditions. The mulch and excess soil should be removed in early spring or as soon as growth is evident.

Spring planting, which is the most common planting time in New York, often results in small-size bulbs and rather low yields.

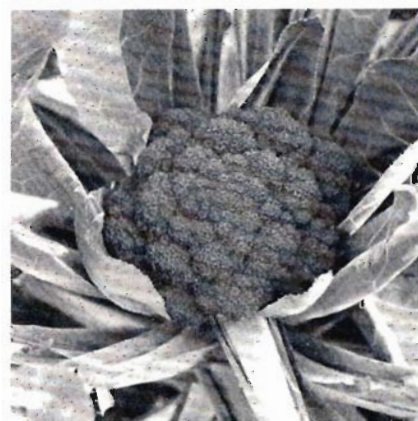
For planting, garlic bulbs are separated into individual cloves, which are usually set 3-4 inches apart in the row with rows 15-24 inches apart. The cloves are planted at a depth that will cover the tip with about ½ inch of soil.

Garlic is ready for harvest when the tops become partly dry and bend to the ground. When the bulbs are removed from the soil, they should be thoroughly dried. Well-dried bulbs stored at cool temperatures and low humidity will last many months.

Garlic, like onions, form bulbs in response to the lengthening days of spring. However, if the propagating stock (cloves) are not exposed to temperatures below 65°F, they may fail to form bulbs. This is a frequent occurrence with home-maintained propagating stock.

Elephant garlic (great-headed garlic). Elephant garlic, or more appropriately great-headed garlic, *Allium ampeloprasum*, is gaining in popularity with home gardeners. Elephant garlic is more closely

Purple Head, a recent cauliflower introduction, develops excellent quality heads that require no blanching.



related to leek than it is to garlic.

Great-headed garlic closely resembles robust types of garlic. They can be distinguished by the small exterior bulblets present at the base of the bulb. These small bulblets are not small cloves and are never present in common garlic. Garlic abundantly produces aerial bulblets, a characteristic not found in elephant garlic.

Great-headed garlic may produce a cluster of several large cloves with a central flower stalk or, in non-flowering plants, a single massive clove. The flavor of elephant garlic is intermediate between onion and garlic; however, it tastes so distinctively different from garlic that it has not been widely accepted as a garlic substitute.

COLE CROPS

The cole group includes many vegetables that are commonly grown in the home garden. This family is divided into the leaf crops and root crops. Most leaf crops such as cabbage, Brussels sprouts, mustard, kale, kohlrabi, collards, and Chinese cabbage are grown for their leaves and stems; others, such as broccoli and cauliflower, are grown for their immature inflorescence. The root crops—rutabaga, turnip, and radish—are grown for

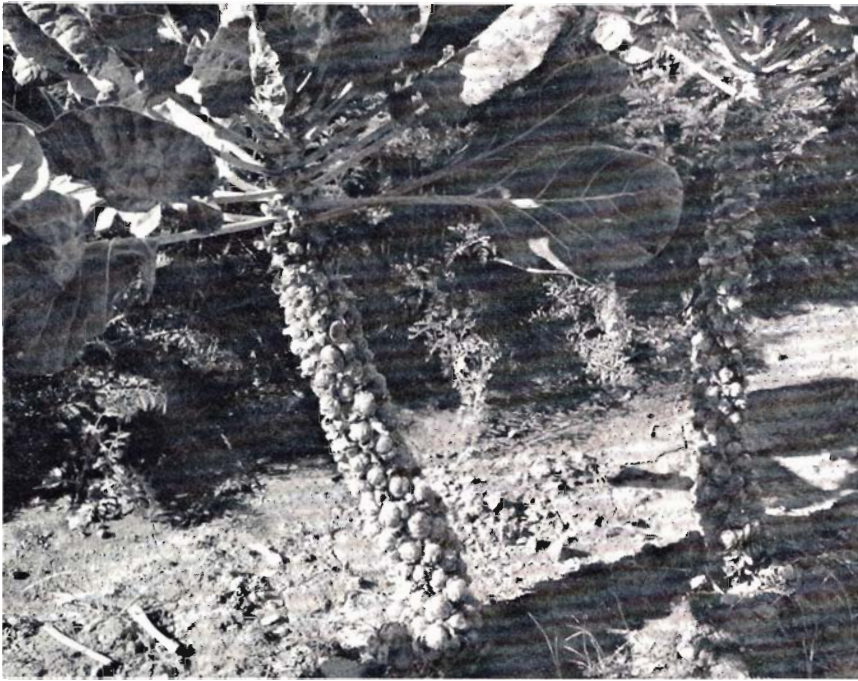
their enlarged fleshy roots and are discussed with the other root crops (p. 23).

The major cole crops are grown from transplants. They are very hardy and develop best quality in moderately cool weather. They can be transplanted as early in the spring as the soil can be worked for an early summer crop or planted in midsummer for a fall crop.

It is important to control insects. Cabbage maggot, aphids, flea beetle, cabbage looper, and imported cabbageworm can destroy a plant in a very short time. A weekly spraying or dusting program is essential.

Cabbage. Cabbage, a popular vegetable high in vitamin content, is easily grown from transplants. By using a few plants of early, midseason, and late varieties, and by making one planting in early spring and another in midsummer, the gardener can have a supply of fresh cabbage for several months. Where the soil is highly acid, lime should be applied in spring to raise the pH to 6.0-6.8 (p. 4). Transplants are set 1-1½ feet apart in rows 2½-3 feet apart.

Cabbage can be harvested as soon as it attains a head of sufficient size and firmness. Heads split as they become overmature. Heads harvested before splitting can be stored for long periods if a temperature between 45° and 32°F is maintained.



Brussels sprouts should be grown only by an experienced gardener because they require a rigid insect control program.

Heads that are to be stored should be solid and free from disease and harvesting injury.

Cauliflower. Cauliflower is more demanding than cabbage in its climatic and cultural requirements. Although it is hardy, it will not withstand as much cold weather as cabbage; and in hot weather cauliflower heads will not develop properly. It is sensitive to a soil reaction below pH 6.0; but if pH is above 7.2, boron deficiency may result.

Young, small transplants can be set in the garden as early as cabbage, for only the matured heads are not resistant to severe freezes. Transplants should be spaced at 24 inches in rows $2\frac{1}{2}$ to 3 feet apart.

Cauliflower must be blanched to get the white heads that are preferred, but off-color heads are usable. Blanching is done by tying the outside leaves together as soon as the curd (head) has reached a diameter of 2-3 inches. Examine the heads every few days to determine when to tie and when to harvest. Harvest the curds when they are still compact and fairly smooth.

Broccoli. Broccoli is an easily grown, highly nutritious crop that is rapidly gaining in popularity with home gardeners. The cultural practices are similar to those for cauliflower, except that the head is green and requires no blanching. After the center head is cut, sprouting broccoli continues to bear by producing side shoots.

Transplants are set 12-18 inches apart in rows $2\frac{1}{2}$ -3 feet apart. The head, the edible part of broccoli, a cluster of green flower buds, should be cut with 6 to 8 inches of stalk before the buds open. The plants are hardy and live until severe freezing weather.

Brussels sprouts. Brussels sprouts require a long growing season and a rigid spray program to control aphids. They should be grown only by an experienced home gardener. Transplants should be set 24-36 inches between plants in rows 4-5 feet apart. Brussels sprouts can be harvested over a considerable period if the lower sprouts are picked when they become firm. The leaf below each sprout is usually broken off so that the sprout can be picked easily. The plant continues to pro-

duce more leaves and sprouts at the top.

At the onset of severe freezing weather, the plants with good sprouts can be cut and stored in a cool cellar for use during the winter.

Chinese cabbage. Chinese cabbage requires a rich soil, an abundance of moisture, a cool season, and short days. If planted before July 1, it often goes to seed without heading. When grown quickly, it is a delicious salad crop and often used as a lettuce substitute; or it can be cooked as is common cabbage. The crop is not easy to transplant and, therefore, does best if the seeds are planted in the row where they are to mature. Plants are thinned to 12-15 inches apart.

Kohlrabi. Kohlrabi is grown for the turniplike enlargement of the stem. It is tasty if picked while it is tender and cooked as is cauliflower or sliced and served raw. With a good supply of moisture it is easily grown in either hot or cold weather. However, kohlrabi must be grown rapidly and harvested when $1\frac{1}{2}$ -3 inches in diameter, or it will become tough and stringy. Sow the seed in rows 18-24 inches apart and thin to 6-8 inches apart in the row.

Mustard. Mustard is grown for its leaves. Its cultural requirements and method of planting are similar to those of other leafy vegetables. The plants require only 35-40 days to reach proper maturity. They are best adapted to early spring and late July plantings.

Collard and Kale. Collard and kale are 2 minor crops that are grown for their foliage. The cultural practices are similar to those for Chinese cabbage, kohlrabi, and mustard. Collards withstand heat better than most members of this family and can be grown as a spring or fall crop. Kale does not grow well in warm weather. Seed is planted in July for a fall crop.

LEGUMES

Peas, snap beans, and lima beans are very popular vegetables for the home garden since they are easy to grow. Snap beans and lima beans are warm-season crops and grow best at temperatures above 75°F. Lima beans should not be grown in the cooler areas of the state. Peas are hardier and grow best under cool conditions, 60°–75°F.

The climate in most areas of New York is favorable for growing peas and beans. Peas and lima beans are grown for their immature seeds, whereas with snap beans the entire immature pod is harvested.

Losses caused by diseases and insects can be minimized by using a weekly spraying or dusting program, treating the seed with fungicide and insecticide before planting, and rotating the planting site. Planting in well-drained soils and removing all old plant refuse increase yields.

Peas. The cool spring climate in New York is ideal for growing peas. The first planting can be made in late March or early April if the soil is workable. An additional planting in late April or early May, or the selection of early, midseason, and late varieties for planting on the same date will assure fresh peas over a considerable period. A planting of a midseason variety can be made in late July for a fall crop, but yields are often disappointing. Peas should be planted at a uniform depth of no more than 1 inch. If the soil is dry, irrigate or wait for a rain before seeding. Wet soil and hot weather cause seed rot. If the seed is not chemically treated by the seed company, the seed treatment recommendation on page 14 should be followed. Plant enough seed to provide 7 to 8 plants per foot of row. Sow 15 to 25 feet of row at each planting or of each variety.

In the home garden, the dwarf varieties of peas are preferred to the

tall-growing varieties. The tall-growing varieties need support, which can be obtained from wire netting or chicken wire strung along the row or a trellis made by adding parallel lines of string as the peas grow.

Peas are harvested when the pods are well filled and eaten while the peas (immature seeds) are still tender and sweet. At prime harvest stage the seeds are high in sugar content, but remain in this condition for only a short time. The higher the temperature, the more quickly peas pass the edible stage.

Snap beans. Snap beans are the descendants of the string bean. The green and yellow (wax) types have the same cultural requirements.

Snap beans in contrast to peas are a tender crop and are easily killed by light frosts. Since they mature in only 50 to 60 days, they can be grown in all areas of the state.

Snap beans can be planted from May 1 to June 25 in warmer areas and between May 15 and July 10 in others. If the soil temperature is below 60°F, seed germination will be poor and very slow. Successive plantings every month up to the latter part of July will assure a steady supply of beans.

Seed should be sown about 1 to 1½ inches deep in rows 2 to 3 feet apart. Somewhat deeper planting to reach soil moisture may be necessary in dry weather. When the plants are 2 or 3 inches high, thin to 6 to 10 plants per foot of row.

Start harvest when the pods reach full length, but are young and tender. Quality decreases as the seeds become larger. A snap bean ready to harvest should break easily with a snap, as the name implies. Harvests should be made at fairly frequent intervals during warm weather.

Pod set is often poor when temperatures exceed 90°F. Deformed pods can result from lack of moisture, incomplete fertilization, and

insect damage during the blooming period.

Lima beans. Lima beans require a longer, warmer growing season than snap beans, and in the cooler parts of the state seldom produce a satisfactory crop.

Seed should not be planted until all danger of frost is over and the soil has warmed. In cold soil the seed will rot although seed treatment will give some control. Plant the seed about 1 inch deep. Abnormal plants develop if the cotyledons are broken off when the seedlings are pushing through the soil. Thin to 3 to 4 plants per foot of row.

Harvesting of green limas should begin when the seeds reach full size and are light green in color, but before the pod shows any yellowing. The seeds turn white as they mature. Overmature seeds are high in carbohydrates and low in sugar; but if allowed to remain on the bush until dry, they make suitable dry beans.

POTTERBS

Spinach, New Zealand spinach, and chard are easily grown vegetables that are used for greens. Their leaves are a rich source of iron and vitamins.

Spinach thrives best in cool weather and will withstand freezing temperatures; chard is an excellent source of greens to grow throughout the summer; New Zealand spinach is tender and should not be planted until the danger of frost is past.

Spinach. Spinach grows well on almost any fertile soil. It is extremely sensitive to acid soil and will not produce a good crop in a soil with a pH less than 5.5. Optimum growth occurs in a soil with a pH of 6.0 to 6.8. Spinach should be grown primarily as an early spring or late summer vegetable since it

forms a seedstalk during the long, hot days of June and July, but can withstand cold temperatures. Slow-bolting varieties should be chosen for spring planting and blight resistant varieties for fall planting.

Spinach is directly seeded by hand in rows and should be planted 1-2 inches deep. When plants are 2-4 inches high, they are thinned to stand 2-3 inches apart in the rows.

Seed may fail to germinate well during hot weather. This can be overcome by pregerminating the seeds. Place the seed between 2 pieces of moist blotting paper, paper towels, or cloth and place them in the refrigerator for a week before planting.

Spinach can be harvested from the time the plants have 6-8 leaves until the seed stem develops. The entire plant is cut off at the soil level.

New Zealand spinach. New Zealand spinach is prepared and served like common spinach, but is an unrelated crop requiring different cultural practices. The plant is sprawling and requires more space. It thrives in hot weather and is sensitive to frost. It does not form a seedstalk as does common spinach. The tender stems and leaves of newly grown branches form the edible part.

Seed is sown by hand directly in the rows in the late spring. It is often slow to germinate; presoaking the seed in water 24 hours before planting will hasten germination. Plants should be thinned to 1 foot apart.

Harvests can begin when the branches attain a length of 8 to 10 inches. The branches are cut or snapped off 3-4 inches back from the tips. This can be continued throughout the growing season as new branches are formed. Only a few plants are required for a family.

Swiss chard. Swiss chard should be grown more extensively in the home garden. It is one of the few



New Zealand spinach is an excellent, all-season vegetable.

vegetables that can be planted in early spring and will continue to bear from spring to fall. Any good garden soil is satisfactory for chard. Planting can be made when danger of hard freeze is past. Seed is hand sown directly in the rows. Plants are thinned to 10-12 inches apart.

Harvesting can begin anytime after the plants develop 4 or 5 leaves. The full grown leaves are cut 1-2 inches from the ground. During harvesting, care should be exercised to avoid injuring the growing point in the center so that new leaves will continue to form and develop. Old leaves are tough and should be cut and discarded.

POTATOES

Potatoes are one of the most productive of all vegetables. But they are generally a low-priced, "out-of-season" produce item, and it is questionable whether it pays to grow them in a garden. A lack of suitable storage facilities and the amount of hand labor involved in harvesting may discourage the gardener.

Potatoes can be planted 2 to 3 weeks before the last expected frost. The top portion of the plant may be destroyed by a light frost, but seldom the seed piece that renews growth. Long periods of wet, cold weather after planting may cause the seed piece to rot. The main crop

is usually planted in May although early varieties can be planted in April.

Potatoes are one of the few crops that grow well in low pH soils and are less troubled with scab at this pH. In the home garden scab-resistant varieties should be used unless a portion of the garden is maintained at a pH between 5.0 to 5.4.

Small potatoes, from 1¼ to 2 inches in diameter, can be planted whole, but larger ones are cut into pieces of approximately 1½ ounces with one or more eyes on each piece. Plant the seed pieces 1 to 3 inches deep and 8 to 10 inches apart in the row. Rows are spaced 2½ to 3 feet apart. Later, to avoid sunburned tubers (greening), hill the soil around the plant during the growing season.

Harvest potatoes when the tops have dried down but before the first heavy freeze. When digging, avoid skinning and long exposure to light. Store harvested tubers where there is no danger of freezing. A well-ventilated, dark room where the temperature is around 45°F. is ideal.

ROOT CROPS

Root crops include several different families of vegetables grown for their enlarged fleshy roots. All have similar cultural requirements.

Beets, carrots, and radishes are the important home garden vegetables in this group. Parsnip, turnip, salsify, rutabaga, and horse-radish are often found in gardens, but they are not as popular as the first three.

The root crops thrive best in cool weather and are one of the groups of vegetables recommended for early New York gardens—midsummer planting permits harvesting until late fall. They tolerate light freezes and can be planted in early spring.

Radishes. Radishes are one of the more popular vegetables in the home garden because they are easily grown and are ready for harvest in 3 to 6 weeks after planting.

They can be planted in the early spring in all types of soil. A spread in the harvest can be obtained by making 1 or 2 plantings in the spring and again in late summer. Or 2 or 3 varieties with different dates of maturity can be planted all at once.

Seed should be planted $\frac{1}{2}$ -inch deep in rows 1–2 feet apart. When the plants are 1 or 2 inches high, they can be thinned to 1 inch apart.

Radishes develop poor shape and go to seed quickly in hot weather; therefore, they should be harvested as soon as roots are of edible size.

The cabbage maggot is the most serious pest of the radish. The larvae (maggot) tunnel into the roots and make them unfit for human consumption. They can be controlled by a soil application of the proper insecticide before planting.

Beets. Beets are easy to grow, yield heavily, and are rich in vitamins and iron.

Seed is hand sown in the row as early as the soil can be worked in the spring. The beet seed or beet ball contains more than one seed. The young seedlings should be thinned to 2 inches apart. If plants are not thinned, the row will be clumps of plants rather than individual beet plants. Competition

with weeds or other beets or prolonged dry weather will cause the beets to become stringy and tough. Good quality is attained when growth is steady through the growing season.

Beets can be harvested when they are 1 to $1\frac{1}{2}$ inches in diameter; this is the most desirable stage if the tops are to be used as greens. Roots can be of good quality up to $2\frac{1}{2}$ to 3 inches in diameter.

Carrots. Carrots are an excellent source of vitamin A, thiamine, riboflavin, and sugar. A spring and midsummer planting of 10–20 feet of row will supply the family from early summer into winter.

Carrot seed are slow to germinate and need careful attention in planting to assure a good stand. In dry weather the seedbed can be sprinkled each evening for 10 to 14 days. This will help insure a better germination and a good stand. Another method to obtain a good stand of carrots in dry weather is to make a furrow approximately 2 inches deep. Sow the seed in the bottom of the furrow and cover with about $\frac{1}{2}$ inch of soil. Boards or papers laid over the furrows until the seeds germinate give further protection against drying out.

Early thinning and cultivation are essential for a good crop. When the plants are well established or about 2 inches high, they are thinned to stand $\frac{1}{2}$ to 2 inches apart in the row. Carrots grow very slowly and compete poorly with weeds. They can be weeded very effectively by spraying with stoddard solvent (undiluted dry cleaning fluid) at a rate of 1 quart for each 100 feet of row. The spray should be applied when the weeds are very small. To prevent undesirable flavors, the stoddard solvent should not be used after the carrot roots become as large as a pencil. The same spray can be used also on young parsnip and parsley plants.

Carrots are edible as soon as they reach usable size. Normally, har-

vesting begins when the roots are $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter at the upper end.

Parsnips. Parsnips require a longer growing season than either beets or carrots. The seed is sown in May or early June. Heavy soils should not be used since the roots can become crooked and often branched. The seed is very slow to germinate and is hand sown in rows, and plants are thinned to 1 to 3 inches apart. The planting, thinning, and cultivation procedures are identical to those for carrots and beets.

Parsnips can be left in the ground until late fall; they develop a better flavor and quality if they are exposed to near-freezing temperatures before they are eaten.

Turnips. A few turnips are grown in some home gardens. In many areas of the country they are grown for their leaves, which have a high mineral, calcium, iron, and vitamin A content.

Soil preparation, planting, and thinning for turnips and beets are similar.

Turnips can be sown until late July, and the later planting usually produces the best quality. They can be harvested as soon as they reach an edible size.

Rutabaga. The rutabaga is similar to turnips except that they have smooth leaves whereas turnips have "hairy" leaves. The root is larger with more side roots and requires 4–6 weeks longer to mature. Plants should be thinned to 4–5 inches apart in the row.

Salsify. Salsify, also commonly known as vegetable oyster because of its flavor, is grown by some gardeners. Its cultural requirements are almost identical to those for parsnips, except that it requires a longer growing season.

Storage of root crops. Under proper conditions the root crops can be



Salsify (left) is an excellent root crop with a flavor reminiscent of oysters.

An excellent, young celery transplant (below). Note the well-developed root system.



kept for several months. They are often stored in an outdoor pit, covered with boards and sod, where high humidity and temperatures near freezing can be maintained. The household cellar is often too warm and too dry.

SALAD CROPS

Salad crops have become increasingly popular in recent years. Their high mineral, vitamin, and bulk content makes a valuable contribution to the family diet.

Lettuce and celery are the most popular salad crops, though endive and parsley are not strangers to most families.

Salad crops thrive during the cool parts of the growing season and, because of their relatively shallow root systems, respond well to irrigation. In many areas of the state, celery and head lettuce cannot be grown successfully without irrigation.

Lettuce. Lettuce is grown on almost every type of garden soil, but does best on a fertile soil that is well

supplied with organic matter. It is very sensitive to low pH, and lime should be applied to the soil if the pH is below 6.0.

Lettuce is a hardy, cool-season crop best suited for growing in the spring or fall. Seed or transplants can be planted as early as the soil can be worked in the spring.

There are 4 types of lettuce available to the home gardener: head, Bibb, loose leaf, and cos. Head lettuce is most likely to form a good head if started from transplants in very early spring and supplied with adequate moisture throughout the growing season. The loose leaf and Bibb have a shorter growing season and are easier to grow. Bibb lettuce has exceptionally good quality, but is difficult to clean.

The seed is hand planted in the row at a depth of $\frac{1}{2}$ inch. As soon as the young plants have developed 2 or 3 true leaves, they should be thinned to 12 inches apart for head lettuce and 6 to 8 inches for the other types. Thinning should not be delayed, for crowding will produce weak spindly plants with little foliage.

The stage at which lettuce is harvested depends on the type. Head lettuce is ready for harvest

when the head becomes firm. Bibb and leaf lettuce are harvested whenever the plants get large enough to use.

Bolting, the premature development of a seedstalk in young plants, is likely to occur if lettuce is grown in hot weather. By selecting slow-bolting varieties this problem can be minimized.

Parsley. Parsley is one of the few herbs that are commonly grown in the home garden. It is very high in iron and vitamins A and C (ascorbic acid).

It will grow in all types of fertile soil. Since the plants are hardy, they can be set in the garden in early spring.

The seed germinates slowly, and the seedlings are delicate. Hence, it is best to sow the seed in the greenhouse, hotbed, or window box or under glass in an open seedbed that has been thoroughly prepared, and then to transplant the seedlings to the row. Commercially produced transplants are also available.

For home use, usually the outer leaves are removed, the central growing point being left. Thus plants will continue to grow, and a few will produce an abundant supply of leaves for the family throughout the season.

Celery. Celery is one of the most difficult vegetables for the average home gardener to grow since it requires a long growing season with adequate moisture from either rainfall or irrigation. The seed is extremely small and slow to germinate, and the young seedlings are very delicate. It is recommended that celery be grown from transplants. Transplants can be set in the garden 6-8 inches apart in a row after the danger of severe freezing is over. Apply water or a starter solution immediately.

Celery responds well to 2 or 3 sidedressings of 5-10-10 at the rate of 1 pound to each 25 feet of row at 3-week intervals.

Blanching of celery is no longer a common practice since people prefer green celery.

Celery can be harvested as soon as several petioles attain sufficient size.

Endive. Endive is used mainly in green salads. Some people prefer it cooked as greens. There are 2 types—the curled and the broad leaf (which is sometimes called escarole). The cultural practices for endive and head lettuce are similar.

Blanching is important when growing the crop for salad. Blanching reduces the bitterness and makes the leaves more tender. When the plants are large, 2–3 weeks before they are to be used, draw the outside leaves over the head and fasten them with a string or a rubber band.

SWEET CORN

Sweet corn is a vegetable that every home gardener should grow if space is available. Its cultural requirements are simple, and the wide selection of varieties available to the home gardener makes it possible for the family to enjoy corn on the cob when it is at the peak of quality.

A continuous supply of corn for the table will be available from midsummer to the first killing frost if an early variety such as Seneca Explorer or Spring Gold is planted in early to mid-May. Follow in about 2 weeks with a second planting of the early variety plus a mid-season variety such as Northern Belle or Gold Cup and a later variety like Seneca Chief. In areas with a fairly long growing season a favorite midseason or late variety can be planted in late June and again in early July.

To assure a good pollination and a full set of kernels on the cob, plant at least 3 adjacent rows of each variety at each planting. Plant seed 1 inch deep in rows 3 feet apart and space plants 1 foot apart or leave 3 plants in hills 3 feet apart.

A sidedressing of commercial fertilizer will assure good vigorous growth. When the plants are approximately 4–6 inches high, apply $\frac{1}{4}$ pound of 5-10-10 fertilizer for each 25 feet of row. Apply the fertilizer in a 2-inch band 6–8 inches away from the corn on one side of the row.

Removal of suckers (side shoots) does little good, may reduce yields, and is time-consuming.

Sweet corn should be harvested when the kernels are plump and in the milk stage, which is about 3 weeks after the first silk appears. At this stage the silks are dry and brown. Carefully examine a few test ears by opening a small window on one side of the ear. Most stalks produce two good ears, and sometimes a sucker will produce an edible ear.

SOLANACEAE

Tomatoes, peppers, and eggplant are grown for their fruit. They have very similar cultural requirements and need a relatively long, warm season to produce a good crop.

Since these crops are very tender, they should not be planted until all danger of frost is over. Normally tomatoes, peppers and eggplant are transplanted. The use of a starter solution is highly recommended at transplanting time.

Early tomato varieties, pepper, and eggplant are “heavy feeders.” In addition to the preplanting fertilizer recommendation given on page 4, some additional fertilizer in the form of a sidedressing is likely to be needed about 3 or 4 weeks after setting.

Fruit set. Gardeners who have

grown tomatoes, peppers, or eggplant are occasionally confronted with the problem of poor or no fruit set. Poor setting of fruit and blossom drop can be caused by periods of cold weather with nights below 55°F, abnormally hot weather, warm nights above 75°F, low soil moisture, and excessive shading.

Blossom end rot. This disorder can be reduced by irrigation and use of organic mulches.

Tomatoes. Tomatoes are an excellent source of vitamin C. A few plants should be in every garden. New varieties make it possible to grow tomatoes in all parts of the state. They are easily grown and can be used fresh, canned, or as juice.

Select both an early- and main-season variety unless the growing season is very short, in which case only early varieties are suitable. The small-fruited cherry varieties are earlier than the standard early varieties. A few plants will supply the family's demand for tomatoes early in the season. Later varieties generally are better for staking than early, small-vined varieties. Verticillium-resistant varieties should be selected when tomatoes are grown in soil previously used for tomatoes. If tomatoes are to be pruned and trained to stakes, the plants can be set as close as 2 × 2 feet or 1½ × 3 feet. Without staking, plants of early varieties can be set 2 × 4 feet or 2 × 5 feet, whereas later large-vined varieties are often spaced 3 × 5 feet or 3 × 6 feet. Pruned and staked plants yield over a longer season and have the advantage of ease in harvesting and cleaner fruit, but usually have a smaller total yield.

Staking tomatoes. Stakes from 5 to 6 feet long and 1½ inches in diameter will serve if each plant has its own stake. Or heavier posts can be set every 10 to 12 feet and a heavy wire stretched across their tops. Heavy strings should lead down

from the wire to the individual plants. A loose loop is tied around the stem just above the ground; and as the plant grows, the stem is twisted around the string at least once a week. Also at this time all new side branches are pinched out. The leader or main stem and the leaves should not be removed.

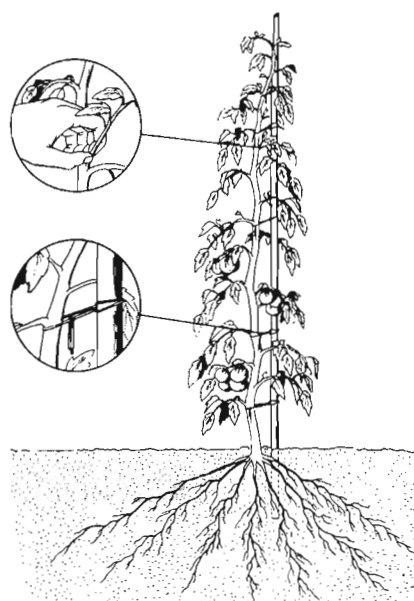
Instead of pruning and training the plants, some gardeners drive in a row of short stakes that stand 10 to 12 inches high and approximately that far each side of the row of plants. They nail narrow boards or slender poles as rails on top of the stakes. The plants are allowed to grow up between these rails and drape over them. Slats can be tacked across between the rails, 10 to 12 inches each side of each plant, to further help to keep the fruit off the ground.

During warm weather, tomatoes should be harvested twice a week. To obtain good color and flavor, hold partly ripened fruit at 70°F and then place them in a refrigerator. Pick some green tomatoes and store in a cool (55°F), moist, dark place before the first killing frost. When desired, ripen a few fruits at 70°F.

Peppers. The cultural requirements are more exacting for peppers than for tomatoes. They should be planted after all danger of frost is past and the soil is warm. They require a fairly long growing season. The crop responds to a good fertilization program including a sidedressing of nitrogen and additional water when rainfall is inadequate. Transplants can be set at 18-inch intervals in rows 3 feet apart.

Peppers are usually harvested after reaching full size, while still in the green or yellow stage. They can be allowed to mature (turn red) on the plant.

Eggplant. Eggplant is extremely sensitive to cool temperatures and will not withstand any frost. A



A tomato plant pruned to a single stem and tied to a stake. Top insert: One method of pinching out lateral branches or side shoots (suckers). Low insert: Detail of slip knot around the stake and square knot under the leaf, loosely tied to allow for stem growth.

growing period of 4 months with daytime temperatures ranging between 60°–85°F is necessary for a good yield. Transplant the seedlings in late May or early June, spacing them 18–24 inches in rows 3 feet apart. In fertile soil, with ideal growing conditions, 2 or 3 plants will yield enough fruit for an average family.

Verticillium wilt is a very serious problem. The organism causing this disease survives in the soil, and eggplant should not be planted in areas of the garden where tomatoes, potatoes, or strawberries have grown.

Fruits should be harvested when they reach a uniformly deep purple color and are properly sized for the variety. Fruit in which the seeds have turned brown are of poor quality and past the edible stage.

VINE CROPS

The vegetables in this group are often referred to as cucurbits or vine crops. The cucurbits are grown for their fruit. They are warm-season crops, which are killed by frost. They are rank growers and occupy a considerable amount of space; however, they respond well to fertile soil, and under favorable

growing conditions a few plants will supply a household. In a small garden, space may not justify growing all members of this family. Success in growing the cucurbits largely depends on controlling the diseases and insects that attack the crop.

Cucumber, squash, and pumpkin seed are commonly sown directly in the garden, but transplants are generally used for muskmelons and watermelons. Plant protectors may benefit all vine crops early in the season. The hill system (p. 8) is commonly used with either transplants or in direct seeding. When the seedlings in the starting container or the hill are 2 or 3 inches high, all but 3 of the seedlings should be removed. Use small scissors to cut off the extra seedlings. Pulling them will disturb the root systems of the remaining plants.

Many home gardeners will not plant different types of vine crops in the same garden for fear of cross-pollination. Cross-pollination will not occur between cucumbers, muskmelon, pumpkin, squash, and watermelon. There is a minor exception to this rule: certain pumpkins and squash will cross. If seed is saved from this cross, the variety will not breed true the following year.

Black plastic mulch has been

Increased yield (especially with vine crops), excellent weed control, and moisture conservation are benefits derived from black plastic mulch.



used very successfully with the cucurbits. In addition to its keeping the garden weed free and the fruit clean, the yields have often been higher than when the cucurbits are grown on the ground (p. 11).

Cucumbers. Cucumbers have the shortest growing season of any of the cucurbits (mature in 50 to 70 days) and can be successfully grown in all areas of the state.

Since the seed will not germinate well in cold soil and the plants are sensitive to light frosts, planting should be delayed until all danger of frost is past. To obtain an extra early crop, transplants can be used along with a hot-tent (p. 9). For later crops the seed can be hand planted directly in the garden. The rows should be spaced 4 to 5 feet apart and the plants thinned to 1 foot apart, or 2 plants should be left in hills 2 or 3 feet apart. Plant the seed 1 inch deep.

Cucumbers should be harvested while the fruit are young and green and the seeds are soft. A yellowish color indicates that the seeds are mature and the fruit are beyond the eating stage. Harvests should be made every other day. Overmature or poorly shaped fruit should be removed from the vines to keep plants producing fruit.

Muskmelon. Muskmelons require a long warm season. Sandy or light-textured soils that warm quickly in

the spring are preferred. In much of upstate New York melons are most likely to produce a satisfactory crop only if the seed is started in pots indoors about 3 weeks before the average date of the last killing frost. After danger of frost is past, set the plants, with the soil intact from the starting container, 3 to 4 feet apart in the row.

Muskmelons benefit by liberal applications of manure or fertilizer. Three to 4 weeks after transplanting, apply a sidedressing of $\frac{1}{2}$ to 1 cupful of 5-10-10 or similar fertilizer in a circle around each hill.

During warm weather, daily harvests are necessary since melons pass prime eating quality rapidly. As a muskmelon ripens, the color between the netting changes from a light green to a tan or yellow. A mature melon will easily come from the vine with a gentle pull. This is known as the slip stage. After harvesting from the vine, the melon should be held at room temperature for 1 to 3 days until the blossom end softens.

Watermelon. The introduction of new early varieties has made it possible to grow watermelon successfully in most areas of the state.

Watermelons need considerably more space than do cucumbers or muskmelons. Hills should be spaced at least 4 to 6 feet apart in rows spaced 6 to 8 feet apart. A sandy or sandy loam soil is desirable. The culture of the watermelon both in

starting transplants and in the garden is similar to that of the muskmelon.

It is not easy to determine the maturity of a watermelon. Wait until the fruit reaches the size described in the seed catalog before looking for any signs of maturity. When the fruit attains full size, check the color of the rind where it touches the ground. A ripe melon will have a cream or yellow color. Some experts can tell if a melon is ripe by the sound when thumped. A metallic ring indicates immaturity, and a dull or muffled sound, ripeness. Watermelons will not continue to ripen after harvest.

Squash. There are 2 types of squash: summer squash, which is eaten while immature, and winter squash, which is eaten when fully mature. Winter squash is a rank grower. If space is a limiting factor, summer varieties can be grown. Summer squash is a prolific yielder, and only a few plants are needed to supply the family needs. Culture of squash is similar to that of melons and cucumbers. The seed is usually sown directly in rows or in hills. When the young seedlings are 2 or 3 inches tall, they should be thinned to 12 to 24 inches between plants. Summer squash should be harvested and used while young and tender. Fruit 6 to 9 inches long and $1\frac{1}{2}$ to 2 inches in diameter are ideal. If the rind of the fruit is too hard to be marked by the thumbnail, it is too



Newly introduced dwarf or bush vined varieties of winter squash and pumpkins allow home gardeners with limited space to grow these crops.

old to use. Old fruit should be removed from the plant immediately to permit new flowers and fruit to develop.

Winter squash can be harvested after they have developed the appropriate color for the variety and a hard rind. They should be harvested before heavy frost since they are injured by low temperatures. Cut the stem from the vine since fruit without a stem will not store well. Store the fruit where it is dry and the temperature can be maintained at 50°-55°F or a little higher.

Pumpkins. Pumpkins do well in many areas of the state. In a small garden the space required to grow pumpkins is seldom justified because many other vegetables give a greater return on the same land. Pumpkins should be grown in rows 6 to 9 feet apart with plants 2 to 4 feet apart or in hills of 2 or 3 plants per hill, 5 feet apart.

Harvesting and storing methods are the same for pumpkins as for winter squash.

Seed and Plant Buying Information

Crop	Recommended varieties*	Total length of row per planting for average family	Transplants or seed required	
			Number of plants	Amount of seed
Asparagus	Mary Washington, Waltham Washington	75 feet	50 roots	—
Beans, Green bush Wax, bush Green pole Lima	Tendercrop, Topcrop, Bush Blue Lake, Blue Crop, Bush Romano	25		¼ lb
	Golden Butterwax, Eastern Butterwax, Earliwax, Midas, Gold Crop	25		¼ lb
	Kentucky Wonder, Dade, Blue Lake	15		1 pkt
	Fordhook 242, Thorogreen, Burpee's Improved, King of the Garden (Pole)	25		¼ lb
Beets	Detroit Dark Red, Early Wonder, Firechief, Honey Red, Ruby Queen	15	10	1 oz
Broccoli	Gem, Waltham 29 (fall), Green Sprouting, Green Comet (H), Premium Crop (H)	15	10	
Brussels sprouts	Jade Cross (H), Long Island Improved	15	8	
Cabbage, Early Midseason Late	Golden Acre, C-C Cross (H), Early Marvel, Emerald Cross (H)	10	6	
	Greenback (Y.R.), King Cole (H.Y.R.), Red Acre, Market Prize (H)	10	6	
	Danish Ballhead, Chieftain Savoy	10	6	
Carrots	Nantes, Royal Chantenay, Danvers 126, Spartan Bonus (H), Baby Fingers	20		1 pkt
Cauliflower	Snowball Imperial, Self-Blanche, Snow Crown (H), Purplehead	15	10	
Celery	Summer Pascal, Utah 52-70, Tendercrisp	4	6	
Chinese cabbage	Michihli, Hybrid G, Crispy Choy (Loose Leaf)	10		1 pkt
Cucumbers, Slicing Pickling	Marketmore 70 (M.R.), Tablegreen 65 (M.R.), Victory (H,M.R.), Gemini (H), Sweet Slice (H,M.R.), Burpless Hybrid (M.R.)	10		
	SMR 18, NK805 (H), Pioneer (H,M.R.), Bravo (H,M.R.)	10		1 pkt
Eggplant, Early Midseason	Early Beauty (H), Long Tom (H), Dusky (H) Black Magic (H), Superhybrid, Black Beauty	5	3	
Endive	Salad King, Broadleaf Batavian, Green Curled	5		1 pkt
Kale	Dwarf Green Curled, Vates	25		1 pkt
Kohlrabi	Early Purple Vienna, Early White Vienna	5		1 pkt
Lettuce, Head Bibb Leaf	Ithaca (spring), Fairton, Great Lakes 659 (fall)	25	12	1 pkt
	Buttercrunch, Summer Bibb, Big Boston	10		1 pkt
	Prizehead, B.S. Simpson, Salad Bowl, Parris Island Cos	20		1 pkt
Muskmelons	Burpee Hybrid, Harper Hybrid, Iroquois, Delicious 51, Saticoy Hybrid, Gold Star, Chaca #1 (H)	15	5 hills	1 pkt
Onions	Sweet Spanish, Early Harvest (H), Ebenezer (sets), Downing Yellow Globe, Beltsville Bunching, White Bunching	20	1 bunch plants or ¼ lb of sets	1 pkt
Parsley	Perfection, Moss Curled, Plain Leaf, Banquet, Bravour	2	6	1 pkt
Parsnips	All American, Harris' Model, New #10	15		1 pkt

Crop	Recommended varieties*	Total length of row per planting for average family	Transplants or seed required	
			Number of plants	Amount of seed
Peas, Early	Greater Progress, Progress #9, Sparkle, Early Market, Knight	40 feet		½ lb
Midseason	Frosty	40		½ lb
Late	Perfected Freezer 60 (M.R.), Wando, Lincoln, Green Arrow	40		½ lb
Edible pod	Dwarf Gray Sugar, Dwarf White Sugar	40		½ lb
Peppers, Sweet	Ace (H), Canape (H), Staddon's Select (M.R.), Yolo Wonder (M.R.), Early Calwonder	10	6	
Hot	Hungarian Wax (hot), Eastern Rocket (hot), Cayenne (small, hot)	10	6	
Potatoes	Katahdin, Sebago, Kennebec, Norland (early red-skinned and scab resistant)	50	5 lb	
Pumpkins	Jack-O-Lantern, Connecticut Field, Spookie, Small Sugar, Youngs Beauty, Cinderella (bush)	10	1 hill	1 pkt
Radish	Champion, Cherry Belle, Comet, Sparkler, Scarlet Knight, Icicle, China Rose (Winter)	5		1 pkt
Rhubarb	Canada Red, Ruby, Valentine, German Wine, Victoria	15	6 roots	
Swiss Chard	Fordhook Giant, Rhubarb, Lucullus, Large White Rib	10		1 pkt
Spinach, Spring	Long Standing Bloomsdale, America, Dark Green Bloomsdale	40		1 oz
Summer	New Zealand	20		1 pkt
Fall	Virginia Savoy, Dixie Market, Blight Resistant Savoy	40		1 oz
Squashes, Summer	Seneca Prolific (H), Zucchini Hybrids, Burpee's Golden Zucchini, White Bush Scallop, Seneca Butterbar (H)	8	1-2 hills	1 pkt
Winter	Butternut, Buttercup, Golden Delicious, Table Queen, Gold Nugget, Emerald (bush Buttercup), Table King (bush)	12	1-2 hills var.	1 pkt
Sweet Corn Early	Seneca Pathfinder, Aztec, Earlivee, Yukon, Golden Beauty	24		1 pkt
(All hybrids) Main Season	Gold Cup, Golden Cross Bantam, Seneca Chief, Jubilee, NK 199, Illini Xtra Sweet	30		1 pkt
	Butter and Sugar, Sprite, Sweet Sue, Harmony	30		1 pkt
Bicolor	Silver Queen, Glacier	24		1 pkt
White		24		1 pkt
Tomatoes, Early	Gardener 67, Spring Set (H)(V&F), New Yorker (V), Pik-Red, Small Fry (small fruited), Presto (small fruited)	6	3	
Midseason	Glamour, Jet Star (H)(V&F), Supersonic (H)(V&F), Betterboy (H,V&F), Roma (V&F, pear)	12	4	
Turnips	Purple Top White Globe, Golden Globe (F), Just Right	10		1 pkt
Watermelon	Summer Festival (H), Sugar Baby, Honey Cream (yellow), Seedless Hyb. 313, Crimson Sweet, Top Yield (H,F), Yellow Baby (H)	20	4-5 hills	1pkt

H = Hybrid, if not indicated in name. M.R. = Mosaic resistant.

F = *Fusarium* resistant, V = *Verticillium* resistant.

Y.R. = Yellows resistant.

1 ounce (oz) = 28.3 grams (g).||

*Through the course of time, recommended varieties will change. Consult your local County Cooperative Extension Service for an annual update of varieties, or write to Variety List, Department of Vegetable Crops, Cornell University, Ithaca, NY 14853.

Cooperative Extension, the New York State College of Human Ecology, and the New York State College of Agriculture and Life Sciences, at Cornell University, Ithaca, N.Y., and the U.S. Department of Agriculture, cooperating. In furtherance of Acts of Congress May 8, June 30, 1914, and providing equal opportunities in employment and programs.

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