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THE VEGETABLE GARDEN

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CONTENTS

	Page
The plan	3
Plantings for five persons	4
Length of time that the ground is occupied	5
Soil management	5
Seed	7
Seedbed	8
Cultivation	8
Planting chart for vegetables	9
The crops	10
Group 1. Asparagus, rhubarb	10
Group 2. Peas	13
Group 3. The "cool" vegetables, transplanted. Cabbage, broccoli, Brussels sprouts, cauliflower, celery	14
Group 4. Greens and salads. Turnip, spinach, kale, endive, lettuce, Chinese cabbage, rape, Swiss chard	17
Group 5. The root vegetables. Parsnip, salsify, radish, turnip, beet, carrot	20
Group 6. The "warm" crops, sown. Lima beans, snap beans, shell beans, edible cowpeas, okra, sweet corn	21
Group 7. The "warm" crops, transplanted. Tomatoes, peppers, eggplant	24
Group 8. The "melon" crops. Cucumber, summer squash, winter squash, cantaloupe, watermelon	26
Onions	29
Winter storage of vegetables	30

Circular No. 309*

THE VEGETABLE GARDEN

By JOHN S. GARDNER

The vegetable garden should produce a supply of fresh vegetables for the family thruout the growing season, and a surplus for canning or storing for use thru the remainder of the year. This may be considered adequately done if the retail value of the vegetables produced amounts to one dollar a week, the year thru, for each member of the household.

THE PLAN

If the garden is to meet the need of the household, a plan should be made. Altho this seems particularly necessary when the garden is small and space must be economized, it is desirable, too, when space is no item, for both labor and expense can be saved by following a good plan. The first step is to measure the garden space and make a drawing of it. On this, the north point should be shown, also walks, rows of perennials, high and low spots and direction of slopes. The position of trees should also be indicated in the plan as a guide for placing the vegetables that can abide such conditions.

The family's tastes should be consulted as to the vegetables to be grown. The better-known vegetables should form the basis of the garden, tho some unusual kinds may be included for variety.

The number of servings of each vegetable desired should be estimated in order to proportion the space required for planting. Assuming that the garden is of average fertility and that the family consists of five persons for whom a serving would be the equivalent of a quart of canned vegetables, the following table will serve as a guide.

For example, if beans are to be served five times a week, 40-foot plantings should be made every two weeks from April 15 to August 1. Altho there might be canning surpluses over table needs from time to time, it is safer to produce such surpluses by doubling the

* This is a revision of Circular No. 243 and is intended to supersede that circular.

plantings made during June and July. Tomatoes, likewise, may be served fresh five times a week for ten weeks, which is the average harvest season for early tomatoes. A second planting about the middle of June will give enough for the table during the remainder of the season, and for canning. The quantities of the other vegetables in the list may be computed in the same way.

TABLE 1. PLANTINGS FOR FIVE PERSONS

Vegetables	Garden space	Servings
Beans	40 feet	10-12
Tomatoes	20 plants	50
Cabbage	20 heads	20
Beets	50 feet	30
Carrots	50 feet	30
Parsnips	75 feet	50-60
Corn	100 hills	25

Companion and Succession Cropping. It must not be supposed that vegetables supplying the total amount determined from Table 1 are to occupy the garden at one time. Removal of early vegetables gives space for later plantings. Table 2 gives the length of time the more usual vegetables occupy the garden.

Since our average gardening season begins April 1 and ends October 1, that is, 180 days, it is seen that:

Late beans may follow early beans, early peas, and even sweet corn.

Late beets and carrots may follow early beans or early peas.

Late greens not of the cabbage family may follow early cabbage.

Late greens belonging to the cabbage family may follow early potatoes.

Besides these, a number of other "succession" schemes may be used, depending on the resourcefulness of the gardener.

Another way to utilize garden space intensively is to plant small early-maturing vegetables near those which are larger and slower in reaching maturity. After the first are harvested the second may occupy the whole area. An example is to sow or set between cabbage plants, lettuce, spinach and even green onions, which are to come out in 6 weeks or so, before the cabbage becomes at all crowded.

Another is to set tomato plants in rows of peas, still being picked, for active growth in tomatoes does not take place until after the season for early peas is over. Peppers and eggplant may be placed in the same way, for the same reason. Radish seed may be mixed with that of parsnips and salsify, half and half, the radishes to mark the row of the more slowly germinating parsnips and salsify, but also to be pulled and used, long before the parsnips and salsify have need of the space.

All permanent crops such as rhubarb, asparagus, grapes and berries should be placed at one side of the garden, out of the way. The same applies to parsnips, winter and spring greens, and salsify, which may be left in the garden to be harvested during the winter. It is important that perennials and the winter crops should be placed on sites that are well drained in all seasons.

TABLE 2. LENGTH OF TIME THAT THE GROUND IS OCCUPIED.

Beans	50- 70 days
Beets	30- 60 days
Carrots	50- 70 days
Peas	40- 60 days
Tomatoes	about 80 days
Peppers	all season
Early cabbage	90-120 days
Early potatoes	120-150 days
Corn	50- 60 days
Radishes	25- 40 days
Lettuce	30- 40 days
Early greens	40- 50 days
Parsnips	all season
Late greens	from August 1 on

SOIL MANAGEMENT

The planning done, the next consideration is the soil and its condition. Altho a sandy loam is ideal, it is not essential, for even an undesirable tight clay may be transformed into a good garden. Location rather than soil condition governs the choice of a garden plot.

Most garden vegetables are prized because of their succulence, and this depends on quick growth. Quick growth is produced by an ample supply of moisture and plant-food. To enable soil to hold

moisture, it must be well filled with "humus," or rotted vegetable matter. This may come from straw, manure, a "green manure" crop of rye, from vegetable tops or even from weeds. The best of these is barnyard manure, for besides furnishing humus material in a quickly usable form, it contains plant food.

Excellent as manure is, it is not balanced in its plant-food elements, nitrogen, phosphorus and potassium, in the proportion most vegetables need. Because of its high nitrogen content fresh manure is a valuable fertilizer for such leaf crops as greens, cabbage or onions, but for the fruit and seed crops, it should be supplemented by phosphate fertilizers.

It is difficult to give specific directions for fertilizing gardens in all parts of Kentucky, but the following are a few general suggestions. Plow under a two-inch coat of manure, follow with a disk, then on each 10,000 square feet (100 feet by 100 feet) broadcast 100 pounds of 20-percent superphosphate, or 125 pounds of 16-percent superphosphate, and drag it in lightly. Soil so fertilized will grow excellent tomatoes, peas, beans, squash and sweet corn. The rows of cabbage, greens, and onions should be sidedressed with nitrate of soda, at the rate of one pound to 100 feet to supplement the nitrogen in the manure. Two dressings should be made, the first, a month after sowing or setting, and the second, from two to four weeks later.

If manure is not procurable, humus must be provided from some other source. If sufficient space is available for a double garden, one-half may "rest" in volunteer grass in alternate years or, better still, one-half may be sown in Japanese clover, soybeans or cowpeas. This provides green matter to turn under. It is not always possible to spare the space for a double garden, so green matter for turning under may be provided by sowing a winter cover crop. Manure crops of this class are rye, hairy vetch, fall greens and oats.

Rye may be sown thru September and October, but does not make much growth to turn under until late spring. For this reason, rye should be used in the parts of the garden where breaking may be delayed until late April or May. The rate of sowing is two pecks to a space 100 feet square.

Hairy vetch should be sown in August so that it may become established before fall. Vetch is particularly valuable as it furnishes nitrogen in addition to humus. It makes its greatest growth in

spring, hence it is useful for the late garden. The sowing rate is one-half peck to 100 feet square.

Fall greens are more important as a cover crop than is generally recognized. The ease with which they can be sown makes them particularly desirable in the small, handworked garden. An excellent plan is to begin sowing greens on vacated portions or rows of the garden from August 1 on, to keep the table supplied, and the surplus for turning under to make humus. Seven-top turnips and hardy kale are best. The sowing rate is one pound to 100 feet square.

Fall-sown spring oats fit well into the plans of a gardener who has a small area. If sown as space becomes available, from August 1 to September 15, they sometimes make as much as 15 inches of growth before frost. While growing, they keep down foxtail and crabgrass, and the fallen tops lessen winter soil washing. The sowing rate is two pecks to 100 feet square.

When humus is to be furnished by green manure crops, plant food should be supplied by means of a complete fertilizer; usually a 3-8-6 mixture will be found satisfactory. The rate of application should be two 125-pound bags to 100 feet square of garden, sown broadcast after the ground has been plowed.

Acidity is an important factor in soils used for growing vegetables. Nearly all vegetables grow best on soils that are slightly acid. The soil should contain lime but not enough to make it alkaline. If manure is used freely the quantity of lime present usually is adequate.

SEED

The use of good seed is an important part of satisfactory gardening. Too often, buying seed is put off so late that the variety and quality desired are unobtainable. It is here that planning helps, for a gardener who has prepared his plan early knows what seed he desires to plant. No better advice may be given than to deal only with firms whose seed has proved satisfactory. Price is not always a guaranty of quality, but it is generally a good indication. The Kentucky seed law requires that each package of one pound or more of garden seeds offered or exposed for sale in the state shall be plainly marked with the approximate percentage of germination and the year when the test was made. The buyer should look for this information and be guided accordingly.

In selecting varieties it is safer usually to depend upon the older sorts which have been found satisfactory. On the other hand, novelties and "special" varieties should not be discriminated against, for some of them have real merit. They should be chosen with caution, however, preferably only when offered by more than one seedsman, or by the same seedsman for two years at least.

SEEDBED

Many gardens are unsatisfactory because of poor seedbed preparation. Sometimes breaking is done when the soil is too wet; and, sometimes, too dry. Frequently, the operations that should follow breaking are neglected or hurriedly done, and a cloddy seedbed results. No set rules can be given for making an ideal seedbed, but the specifications for a good one may be laid down. They are, that the soil particles should be as fine as the seed to be sown, for a depth of at least two inches below the seed, or, better still, to the depth of the plowed soil.

Preparation of the seedbed begins with breaking the soil as deep as possible, turning the manure under. Next should follow a thoro disking, to cut the furrow slices fine. Then the commercial fertilizer should be broadcast and worked in by smoothing the seedbed with an A-harrow or a plank drag or, better, with both.

The depth of seed sowing is determined by the size of the seed; the larger the seed, the deeper it may be sown. It has been determined by experiment that the proper depth is eight times the thickness of the seed.

CULTIVATION

Cultivation should always be level. This is true even for the earliest "cool" vegetables, but much more so for those whose growing season extends into dry summer weather. Altho a ridge drawn to the row may be of benefit to vegetable roots in extremely wet seasons, it is of great disadvantage in dry weather, for the soil moisture level is lowered. Cultivation should always be shallow. If deep stirring must be done to loosen middles that have become beaten down, it is important not to disturb the roots. Generally speaking, a depth of working no greater than one-half inch suffices to uproot small weeds that may have started and to leave a broken surface that can absorb even light rain.

TABLE 3. PLANTING CHART FOR VEGETABLES

Kind of vegetable	Seed for 100 ft. of row	Seed for 1 acre	Plants per ounce of seed	Space between rows, Inches.	Space between plants, Inches.	Days from planting to maturity	Crop expected from 100 ft. of row.
Asparagus seed	1 oz.	3 lbs.	500	14-24	4-6	(4 yrs.)	300 lbs.
Asparagus plants	.....	.....	.....	48	36	(3 yrs.)	300 lbs.
Beans, bush	2 lbs.	.....	.....	30-36	2-3	50-75	5 bu.
Beans, pole	1 lb.	30 lbs.	.....	40-48	6-8	60-75	5 bu.
Brussels Sprouts	.....	5 oz.	4000	24-36	16-22	100	.....
Beet	2 oz.	8 lbs.	.....	14-24	1-3	60-70	2½ bu.
Cabbage	.....	4 oz.	5000	24-36	16-22	100-140	90-150 lbs.
Chinese cabbage	1 oz.	.....	2000	.....	.....	60-70	85 heads
Carrot	1 oz.	3 lbs.	.....	16-24	1-3	70-90	2 bu.
Cauliflower	.....	5 oz.	4000	24-30	20-24	75-90	75 heads
Celery	.....	5 oz.	8000	24-40	4-6	120-130	150 stalks
Chard	.....	.....	.....	30-36	10-12	50-60	10 bu.
Sweet corn	1 oz.	12 lbs.	.....	34-42	5-6	75-95	12 doz.
Cucumber	1 lb.	3 lbs.	.....	48-60	36-48	60-70	2 bu.
Eggplant	1 oz.	8 oz.	2000	24-30	18-24	80-90	200 fruits
Kale	.....	5 lbs.	.....	24-32	18-24	55-65	3 bu.
Lettuce	1 oz.	4 lbs.	.....	12-18	4-8	65-85	4 bu.
Lettuce (Cos)	½ oz.	4 lbs.	.....	12-18	4-8	60-70	100 heads
Cantaloupe	1 oz.	3 lbs.	.....	70-80	48-60	80-95	60 fruits
Watermelon	2 oz.	4 lbs.	.....	90-100	72	80-90	40 fruits
Mustard	1 oz.	4 lbs.	.....	14-24	4-6	40-50	3 bu.
Okra	2 oz.	10 lbs.	.....	24-40	12-18	50-60	.....
Onion	1 oz.	5 lbs.	.....	18-24	3-4	100-140	2 bu.
Onion (sets)	2 lbs.	8 bu.	.....	18-24	3-4	80-100	2 bu.
Parsnips	1 oz.	4 lbs.	.....	18-24	3-4	200	2 bu.
Parsley	1 oz.	4 lbs.	.....	12-20	4-6	50	200 plants
Peas	1½ lbs.	150 lbs.	.....	24-36	1-2	60-80	1 bu.
Pepper	.....	2 lbs.	1000	20-30	18-20	115-130	2 bu.
Pumpkin	5 oz.	4 lbs.	.....	95-110	60-80	120	50 fruits
Radish	1 oz.	4 lbs.	.....	12-18	1-2	25-30	100 bunches
Spinach	1 oz.	8 lbs.	.....	18-24	3-5	40-50	2 bu.
Spinach (New Zealand)	1 oz.	8 lbs.	.....	36-48	18-24	50-60	2 bu.
Squash (bush)	2 oz.	5 lbs.	.....	42-48	42-48	55-65	200 fruits
Squash (vining)	2 oz.	3 lbs.	.....	70-90	60-90	90-110	80 fruits
Tomato	.....	4 oz.	2000	40-60	36-40	110-130	10 bu.
Turnip	1 oz.	2 lbs.	.....	12-20	2-4	45-60	2 bu.

THE CROPS

The vegetables will be discussed in the groups into which they fall because of similarity in cultural requirements. The culture of potatoes is discussed in Kentucky Extension Circular No. 307 "Potato Growing;" and sweetpotatoes are discussed in Kentucky Extension Circular No. 308 "Sweetpotato Growing."

GROUP 1. ASPARAGUS AND RHUBARB

Asparagus and rhubarb are truly luxuries in the sense that their flavors are unique. They are not luxuries, however, in the sense that they are difficult to grow, for their culture presents no difficulty that any gardener may not overcome. Because the methods of growing them are similar, they will be discussed together. Both are perennials. Asparagus may occupy the same ground sometimes for as long as 30 years, and rhubarb, 3 to 6 years. Because of this fact, the site for the planting should be chosen where there is perfect drainage the year thru, for neither can long abide "wet feet." Again, the site must be such that there is no interference with preparing the garden for the annual vegetables. The best location is along one edge of the garden. The soil should be fertile and deep.

Preparation of the bed is critical. The ground should be plowed or spaded deep and a heavy coat of manure worked into it or, if manure cannot be had, a heavy sod or a growth of rye, soybeans or cowpeas, purposely sown to furnish humus should be turned under.

Asparagus. The parts of asparagus used for food are the green shoots that arise from the roots, and the deeper these lie, the longer the planting will stay in production. For this reason, asparagus crowns are always set deep. A trench should be made, 15 inches wide and 12 inches deep. As the trench is being made the top soil should be laid to one side; the subsoil, to the other. In the bottom of the trench two inches of manure are tramped and covered with a few inches of top soil. The crowns are set, their roots fully spread out and covered with the remaining top soil. The spacing of the crowns is 18 inches to 2 feet. The wide spacing is the more usual unless heavy fertilizing can be continued, for crowding shortens the life of the planting and reduces the size of the shoots. Rows of asparagus should be at least 3 feet from any other vegetable and from each other; 4 feet is better. When the shoots have grown above the garden level, the trench is filled with the subsoil.

No harvesting should be done in the year of setting, and preferably not in the year after, for the object is to establish heavy mats of roots, necessary for the production of fleshy shoots later. In the third year of the planting, cutting may begin, but should not be continued longer than 6 weeks. Thereafter systematic harvesting may be done, but in any year it is unwise to continue long after the end of June, for opportunity must be given the roots to recover, and to add reserves from which future harvests must come.

Asparagus needs plant food in quantity and if the bed is to continue productive, fertility should be kept up carefully. The best way is to spread a heavy mulch of manure, not early in the spring, but at the end of the cutting season, after having hoed out any weeds that may have started. In the years the bed is being established, the manure should be spread early in the spring before the shoots begin emerging. The reason for manuring a bearing bed after cutting is over is that until that time the roots do not take plant food from the soil but produce the shoots from reserves that have been stored in them in the previous season. It is only after the plants begin to branch and to form leaves that the roots can actively begin to absorb plant food from the soil. Each spring, as early as the weather permits, the bearing bed should be hoed or harrowed deeply, but not to touch the roots. This puts the humus from the previous summer's manure mulch into deeper soil, and helps the shoots to come thru straight.

There are several varieties of asparagus but because of the prevalence of the rust disease, it is recommended to use only the rust-resistant varieties, Mary or Martha Washington.

Asparagus may be grown "white" or "green." If white spears are desired, a mound is thrown over the row, and the asparagus is cut about 8 inches beneath the surface, just as the tips appear. To provide soil for the mounding of the row, generally 12 inches more space is allowed between the rows. "Green" asparagus is permitted to grow until just before the shoot tips begin to lose compactness, and is cut at the ground line or just below it.

Asparagus suffers from only one pest, the asparagus beetle, a chewing insect. Control consists in cutting stalks every other day. Stalks which have been left to grow should be thoroly covered occasionally with lead arsenate, 3 pounds to 50 gallons of water to which 3 pounds of soap have been added.

Rhubarb. In setting rhubarb, piece-roots are used, a growing tip on each. These are set at the depth they originally grew, the tip just at the ground surface. The spacing in the rows is 30 inches or 3 feet, and the rows are 3 feet apart. Rhubarb may be set in the spring, as early as the land can be prepared, or at the end of the cutting season, usually in August. Customarily, no harvesting is done in the year the bed is set, altho in some years enough growth may occur for a light pulling in late fall.

The management of a planting of rhubarb depends on the use to which it is to be put. Commercial gardeners who mean to produce for the early market, mulch their fields heavily with manure as soon in the spring as hard freezes are over. Sometimes this mulch is over 8 inches thick. Under this, the crowns start, and when the leaf tips emerge, the manure is raked away and cultivated in. If particularly early growth is not sought, a moderate coat of manure is spread between the crowns and worked in. Thereafter, cultivation is given to keep down weeds.

Harvesting may begin as soon as the leaf stems have reached proper size but it is well to remove at one pulling only half the leaves that are ready, in order that too much drain upon the plants may not take place.

No insects seriously injure rhubarb, but the leaf disease, anthracnose, may be quite troublesome, even in the first year. It is not uncommon for stands to become so reduced that resetting must be done in 3 years. Heavy fertilizing lessens the trouble, and so does spraying with Bordeaux mixture, 4-4-50. Three sprayings should be made, the first just as the buds begin bursting; another, in 2 weeks, and the last, 2 weeks later. Good advice to persons who mean to grow rhubarb is to use cuttings from crowns obtained locally, that have shown resistance to the trouble.

Victoria has long been a standard variety, and several sorts with more color are obtainable.

GROUP 2. PEAS

Variety	Characteristics
Alaska	Smooth-seeded; hardy; quite productive; pods and seeds small; 20 inches.
Radio	Smooth-seeded; hardy; very productive; pods and seeds large; 20 inches.
Blue Bantam	Wrinkled-seeded; quality extraordinary; pods and seeds large; 12 inches.
Gradus or Prosperity	Wrinkled-seeded; high quality productive; 30 inches.
Little Marvel	Wrinkled-seeded; exceptional quality; very productive.
Telephone	Wrinkled-seeded; very productive; quality good unless left too long; 48 inches.

The time for sowing peas is February 15 to April 1; for sowing before March 15, only the smooth-seeded sorts, like Alaska should be used. Seed for the earlier plantings should be sown about one inch deep, but for later planting, if the soil has dried out somewhat, it is advantageous to make the seed furrow as deep as 4 inches, and to cover the seed only an inch. The balance of the soil should be drawn to the row during cultivation. Peas sown in this manner continue bearing farther into warm weather. A good practice is to sow peas in pairs of rows 6 inches apart and 2½ to 3 feet between pairs. Thus the dwarf bush sorts support each other, and for the taller sorts one line of poultry wire or brush set between the rows suffices to support both.

Cultivation. Except for the earliest plantings and in wet gardens, cultivation should be level.

Pests. Peas are attacked by only one insect of any importance, the **plant louse**. This insect may be controlled by tobacco extract in spray or dust form, or by any of the several recently introduced compounds of pyrethrum. Altho a tobacco spray may be prepared at home, by soaking trash tobacco in water, it is better to use a commercial tobacco extract which has a definite strength. The 40 percent nicotine solutions are recommended. Directions for using are found on the container. Two percent nicotine dust is the material to use if dusting is preferred. This is obtainable of the manufacturers of nicotine solution.

GROUP 3. THE "COOL" VEGETABLES. TRANSPLANTED

Vegetable and variety	Characteristics
Cabbage	
Winningstadt	Pointed heads ; earliest of all ; weight, 12 oz. to 1 lb.
Jersey Wakefield	Pointed heads ; next early ; weight, 1 to 2 lbs.
Charleston Wakefield	Blunt-pointed heads ; second early ; weight, 2 to 6 lbs.
Golden Acre	Round heads ; very early ; weight, 1 lb.
Copenhagen Market	Round heads ; second early ; weight 3 to 6 lbs.
Drumhead	Cylindrical heads ; late ; stores well ; weight, 4 to 10 lbs.
Flat Dutch	Flat heads ; late ; stores well ; weight, 6 to 15 lbs.
Yellows-resistant All-seasons	Used early or late ; resistant to yellows or wilt ; flat ; may be stored ; weight, 3 to 8 lbs.
Yellows-resistant Early Jersey Wakefield	Yellows-resistant ; in all other respects the same as Early Jersey Wakefield.
Marion Market	Yellows-resistant ; flat heads ; slightly later than Charleston ; weight, 3 to 8 lbs.
Iacope	Yellows-resistant ; in all other respects the same as Copenhagen.
Hollander	Yellows-resistant ; similar in most respects to Drumhead.
Broccoli	
Calabrian	Use only the green sprouting kinds.
Brussels Sprouts	
Long Island Improved	Grown for fall crop only.
Cauliflower	
Snowball	The best and most widely grown variety.
Celery	
Golden Self-blanching	Excellent quality ; easily blanched ; 120 days from sowing seed to edible stage.
Giant Pascal	One of the best varieties for winter use ; 140 days from sowing seed to edible stage.

Early cabbage plants should be set in the spring as soon as the ground can be prepared. The plants should be 6 to 8 weeks old at setting time.

The gardener may raise his own plants in a hotbed (see Kentucky Extension Circular No. 276) or he may purchase the so-called "frost proof" plants from southern states. These plants are called "frost proof" because they are grown in the field and have become "frost-hardy." Before he purchases "frost proof" plants, however, the gardener should assure himself that they are free of Black Rot,

for this disease may be introduced into a garden by infected plants. Also "frost proof" plants should be examined carefully for plant lice. If any lice are found, the plants should be dipped in a solution of nicotine sulfate prepared according to the instructions on the container.

For the late crop, the plants should be set the latter part of June. Plants may be started in a seed bed four to six weeks prior to setting time, or 2 or 3 seeds may be planted at each place where a head is to stand, and the seedlings thinned to one.

Cauliflower does best in Kentucky as a spring crop. It is handled exactly like cabbage, except that it is advisable to set it a week or so later. Cauliflower requires special treatment while the head is forming. As soon as the "flower" head appears, four or five of the lower leaves of the plant should be lapped over it and fastened with soft twine or with a toothpick. This keeps the cauliflower white and tender.

Broccoli, too, does best as a spring crop, tho plants that live thru the summer may make a crop in the fall. The clusters of buds that spring from the axils of the leaves should be taken when they have reached full size, and before they open.

All these crops respond to fertilizing in addition to the general fertilizer suggested (page 6). Side dressing with chicken manure at the rate of a bushel to 200 heads, is recommended or, better still, with nitrate of soda, at the rate of one pound to 100 feet of row.

Celery is handled in the same manner as cabbage except that, when the plants are about half grown, the leaves should be gathered together so they stand upright, and held so by forming a low ridge of earth against them. Usually this is done about 8 weeks after setting. Three or four weeks later, the summer and early fall varieties should be blanched by excluding light from the bases of the stalks, with boards or paper. Winter varieties, such as Giant Pascal, usually are blanched with a bank of earth. Blanching causes the green coloring matter of the stems to fade out and induces heart growth. The sharp flavor of green celery is toned down, as well.

Pests. The **cabbage worm** is the most serious pest of cabbage, cauliflower and broccoli. Lead arsenate may be used as a dust or spray while the plants are young. After heads begin to form the worm should be controlled by applying a dust containing 0.5 to 1.0 percent of rotenone, at the rate of 25 to 30 pounds per acre. One

pound of derris powder (containing 4% rotenone) is mixed with 7 pounds of some inert substance such as talc or clay. **Cutworms** often destroy cabbage and other transplanted plants soon after they are set. Use poison bait made as follows: mix, dry, $\frac{1}{2}$ pound of Paris green and 12 pounds of bran; moisten with one quart of molasses and enough water to make a crumbly mash. Toward evening sow the bait along the rows and in areas surrounding cut-off plants. Cutworms always feed after dark. This bait is **POISONOUS** to **POULTRY** and other animals.

Celery sometimes is attacked by foliage-eating insects; the control is poisoning as suggested for cabbage, but poisons other than rotenone and pyrethrum should not be used after blanching begins.

Diseases. Two diseases affect cabbage. They are **black rot** and "**yellows.**" Those who grow their own plants may guard against black rot by treating the seed. The procedure is as follows:

1. Dissolve one $7\frac{1}{2}$ grain tablet of mercury bichloride in one pint of water. (Only wooden or crockeryware containers should be used.) Bichloride is a deadly poison, but does not burn the hands.
2. Put the seed into a cloth bag, and wet thoroly.
3. Dip in the solution for 30 minutes.
4. Wash in five changes of water and spread to dry quickly, but not in the sun.

Another way which is perhaps more effective but less convenient is to immerse the seed for 30 minutes in water at 122 degrees F. The temperature must be carefully adjusted by means of a good thermometer.

The "yellows" is a disease likely to occur in a plant bed or a field which has been used too often for cabbage. No treatment is effective, but varieties resistant to the disease should be used. These are Iacope, Marion Market and Hollander, in the order of their season.

A serious disease of celery is **leaf-spot**, which causes spotting at first but, later, the yellowing and rotting of the entire plant. Its control is to spray with Bordeaux mixture. Bordeaux mixture may be procured from druggists or seedsmen in dust form, needing only to be stirred into water, or it may be home mixed with scarcely more trouble, with a gain in effectiveness, and at a saving in cost. Bordeaux mixture prepared for use in dust form, called "copper-

lime dust," can be obtained from seedsmen and druggists. It is not feasible to mix copper-lime dust at home.

Whichever form of Bordeaux is used, three applications are recommended, the first, when the celery is set; the second, in 2 weeks and the third, again, in 2 weeks. Procedure for home mixing is as follows:

1. Into a glass or wooden container put 5 quarts of water and suspend a sack containing 1 pound of copper sulfate (bluestone) so that the lower part is submerged an inch or so in the water. The bluestone will dissolve without attention in about 2 hours. This is "bluestone stock."

2. Into the tank (preferably brass) of a 3-gallon compressed-air sprayer, put 9 quarts of water, then, 1 quart of "bluestone stock" and then, $\frac{1}{4}$ lb. of screened, hydrated lime.

3. Close the sprayer, and shake the tank endwise, ten times. The result is $2\frac{1}{2}$ gallons of 4-4-50 Bordeaux mixture.

Mixed Bordeaux should be used immediately after it is made, for it spoils on standing. Also, it may corrode the metal of which the sprayer tank is made.

Unlike mixed Bordeaux, the "stock" may be kept indefinitely in a crockery or glass container, tightly corked. If evaporation occurs because of the "stock" having been saved in an open container, water should be added to replace that lost.

GROUP 4. GREENS AND SALADS

The greens and salads are grouped under two names, "cool" and "warm." The "cool" kinds thrive best at temperatures between 60 degrees and freezing, and can survive quite hard frosts without harm. The "warm" kinds, on the other hand, are harmed by even mild frosts, but are adapted to growing when temperature mounts. Spring greens and salads in the "cool" group may be planted as soon as the ground can be prepared, but those in the "warm" group should not be seeded until a few weeks after danger of frost is past, and the soil temperature has risen to about 60 degrees, April 15 to May 1. An exception is Swiss chard, akin to beets, which may be started when the spring sowing of these is made.

GREENS AND SALADS

Vegetable and variety	Characteristics
"COOL"	
Turnip	
Seven Top	For fall use ; usually lives thru the winter.
Japanese Foliage	Spring and fall ; makes fair turnips ; resistant to plant lice.
Spinach	
King of Denmark	Both heat and cold resistant. Can be made to winter over, under mulch protection.
Norfolk Savoy	Resistant to Yellows.
Kale	
Siberian	Winter hardy to some extent. For spring or fall use.
Endive	
White Curled	A fall salad.
Lettuce	
Grand Rapids	Leaf type ; for spring or fall use.
Big Boston	Heading type ; for spring use ; started in cold frames.
Hanson	Loose-heading type ; for spring or fall use.
New York	Heading type ; sometimes called "Wonderful" ; for spring or fall use ; somewhat resistant to warm weather.
Cos Trianon	Quite resistant to hot weather.
Chinese Cabbage	
Pe Tsai	For fall use ; can be stored for early winter use.
"WARM"	
Spinach	
New Zealand	For summer use ; a continuous cropper ; heat and drouth resistant.
Kale	
Scotch Curled	Somewhat heat resistant ; for fall and spring.
Rape	
Dwarf Essex	Sometimes called "Smooth spring kale" ; goes to seed slowly.
Swiss Chard	
Lucullus	For use all summer, a continuous cropper.

General Culture. When the seed for spinach, mustard and kindred greens are sown at the rates given in the planting chart (page 9), the stand will be found to be satisfactory, but it is sometimes advisable to thin the seedlings to one inch. For **Swiss chard**,

New Zealand spinach, Chinese cabbage, endive and lettuce, special procedure should be followed.

Swiss chard should be thinned to a stand of 10 inches or one foot. Greens may be gathered thru the summer by taking only the outer leaves, leaving the central bud intact.

New Zealand spinach may be sown in the same manner as late cabbage (page 15). The spacing for the plants should be no closer than two feet, in rows three feet apart. New Zealand spinach is harvested by pinching off the clusters of leaves at the ends of the branches. The plants continue branching all summer, making the supply of greens a continuous one.

Chinese cabbage and endive may be sown in continuous drills and thinned to the proper stand, or the plants may be grown in a bed and set in the same manner as late cabbage (page 15). The final stand of either should be ten inches or one foot apart. Chinese cabbage forms its head of itself, but endive needs special treatment. Two weeks before endive is to be harvested, the plants must be tied up loosely with soft twine, so as to shade the heart and to induce center growth. This should not be done too far ahead of harvest or rotting may result.

Lettuce may be sown in continuous drills and thinned to a stand of six inches for the leaf sorts or ten to twelve inches for the heading varieties.

Pests. A variety of chewing insects injure the greens and salads, but not often seriously. If it becomes necessary to control them and the plants are small, use rotenone or pyrethrum as for cabbage (page 15).

The summer-sown greens and salads are sometimes attacked by **black fleabeetles**. These beetles riddle the foliage with holes, sometimes destroying the plants. They are controlled by spraying with rotenone extract, at the rate the manufacturer recommends. To make insect control easier, row-sowing of all greens is suggested, rather than broadcasting.

GROUP 5. THE ROOT VEGETABLES

Vegetable and variety	Characteristics
Parsnip Guernsey	Best standard variety.
Salsify Sandwich Island	Best standard variety.
Radish Scarlet Turnip	Round shape ; 3 weeks to maturity.
Icicle	Long shape ; best summer ; 5 weeks to maturity.
French Breakfast	Oblong shape ; 4 weeks to maturity ; can be stored.
Chinese Winter	Long shape ; large ; 9 weeks to maturity ; can be stored.
Turnip Purple Top Strap-leaved	Early ; medium size.
Purple Top Globe	Main crop, all-purpose ; large size.
Beet Crosby Egyptian	Extra early ; pink and red.
Detroit Dark Red	Main crop ; deep red.
Carrot Chantenay	Excellent all-purpose.

Parsnips and salsify should be sown as early in the spring as the soil will permit. They occupy the ground the summer long. The rest of the root vegetables fall into two plantings, early and late. The early plantings are sown as soon as the soil can be prepared, and the late, between June 15 and July 15, except radishes and turnips, which may be sown as late as September 15 to October 1.

The root crops do not require rich ground in the sense that cabbage does, but they must be well supplied with humus to hold an abundance of moisture and to make shapely roots. The general manuring recommended previously (page 6) suffices.

Pests. Root vegetables are remarkably free from insect attack, except radishes and turnips, which sometimes suffer because of plant lice (see page 13), and **black fleabeetle** (see page 19).

Salsify may be attacked by blight. It is controlled by spraying with Bordeaux mixture. A spray should be applied as soon as the plants are up and two more sprays should follow at two-week intervals. Turnips and radishes may suffer from black rot which stunts the tops and disfigures the roots. To avoid this disease these crops should not follow cabbage or early greens of the cabbage family, in the same year.

GROUP 6. THE "WARM" CROPS. SOWN

Vegetable and variety	Characteristics
Lima Beans	
King of the Garden	Pole type ; white-seeded.
Leviathan	Pole type ; green-seeded.
Henderson	Bush type ; small pods and seeds.
Yopp's	Bush type ; medium size ; prolific.
Snap Beans	
Red Valentine	Bush type ; somewhat cold-hardy.
Stringless Greenpod	Bush type ; free from strings.
Bountiful Bush	Bush type ; exceptionally heavy yield, but prone to becoming shucky ; strings troublesome.
Kentucky Wonder	Pole type ; exceptionally good quality.
Kentucky Wonder Wax	Similar to ordinary Kentucky Wonder but somewhat shy as to yield.
Lazy Wife	Pole type ; pods short ; quality unsurpassed.
Shell Beans	
Dwarf Horticultural	Bush type ; used shelled green ; sometimes called "cranberry" and "fall bean."
Horticultural	Pole type ; sometimes called "speckled cranberry" or "fall bean" ; used as snap beans or shelled, green.
Edible Cowpeas	
Blackeyed	Used in late summer, shelled green or dried for winter use.
Lady Pea	Seeds small ; cowpea flavor subdued ; used shelled green or dried for winter use.
Okra	
White Velvet	A popular variety.
Sweet Corn	
Golden Bantam	The original yellow sweet corn ; ears small ; early ; subject to Stewart's disease.
Whipple's Yellow	Golden color ; larger than Golden Bantam and somewhat earlier.
Bantam Evergreen	Golden color ; a cross of Stowell's Evergreen on Golden Bantam ; size of ears improved ; medium early.
Golden Cross Bantam	Yellow ; medium early ; resistant to Stewart's disease.
Early Adams	White grains ; the original early sort.
Howling Mob	White ; midseason ; the long shucks afford some protection against the ear worm.
Country Gentleman	Midseason and late ; zigzag grains ; white ; quality of the best.
Stowell's Evergreen	Midseason and late ; white ; yield excellent ; good canning sort
Hickory King	Midseason and late ; semi-sweet.

Beans (except Limas) and the early varieties of sweet corn should be planted as soon as danger of frost is past. Planting Lima beans should be deferred until the ground has become definitely warm. In planting Lima beans, particularly the large-seeded varieties, there is distinct advantage in placing the seed, eye down.

Later plantings of beans should be so timed that a continuous supply of fresh beans may be had until frost. The plantings made in June and July should be doubled to assure a surplus for canning.

Because the medium or late varieties of corn need more time

than the others, they should be planted at the same time as the early sorts, to keep the table supply unbroken. In good seasons the early corn rows may be put into corn again, but early varieties should be used, to mature before frost.

Altho okra plants may be started in hotbeds in the same manner as tomato plants, and at the same season, the usual custom is to sow the seed in the open garden. It is best to wait until the ground is warm, for okra seed rots easily. In order to assure a stand, two seeds should be dropped at each place. The rows should be thirty inches apart in hand-worked gardens or thirty-six inches if horse-drawn cultivation is to be done. The spacing in the rows should be eighteen to twenty-four inches.

Since all the vegetables in this group are "fruit" or "seed" vegetables, their main fertility requirement is phosphorus. Altho the general fertilizing recommended (page 6) gives good results, it is advantageous to double the amount of superphosphate in the manure-superphosphate combination. The best complete fertilizer for these crops is 4-12-4.

Bean Pests. Sometimes early beans are infested with the **spotted cucumber beetle** and the **Southern bean beetle**. Usually these insects do little damage, but if it should become serious, as in a cool season when growth is slow, arsenical sprays or dusts should be used but only before pods form. After that rotenone dust or spray should be substituted. It is not safe to use lead arsenate on beans, because it may cause burning of foliage. Rather the following should be used:

Spray: Magnesium arsenate, 1 rounded tablespoonful; water, 1 gallon.

Dust: Magnesium arsenate, 1 pound; hydrated lime, 6 pounds.

Or: Calcium arsenate, 1 pound; dusting sulfur, 1 pound; hydrated lime, 4 pounds.

Only ordinary spraying or dusting methods are needed, for both these insects feed on the upper surfaces of the leaves.

A more serious pest than either of those just named is the **Mexican bean beetle**,* for its habit is to feed on the under sides of the leaves; further, it remains on the beans thruout the season. A chewing insect, the dusts and sprays just given are effective against it, but the dusters or the sprayers must have upturned nozzles to put

* See Kentucky Extension Circular No. 257.

the material where the insects feed. Because the Mexican beetle feeds so voraciously in both the larval and adult stages, it is important to begin spraying or dusting as soon as the first sign of injury is seen.

Three dustings or sprayings are enough if a proper schedule is observed. This is, to watch for the first beetles on any planting and then to look more closely for the first clusters of eggs, then make the first application. TEN days after, a second spraying or dusting should be given, and in TEN days, the third. This should be the program on every planting of beans. If it becomes necessary to spray after pods have begun forming, rotenone should be used instead of arsenicals.

The most serious bean disease is anthracnose, sometimes called blight. It causes spotting of the leaves and sometimes of the pods. In severe cases the plants die, sometimes before any beans have matured. The use of clean seed and clean soil is the best means of preventing the blight. Partial check of this disease may be had if Bordeaux mixture (page 17) is applied as soon as first signs of spotting are seen. Altho this disease is more severe in cool weather, it is well always to be on the alert for any symptoms, and apply Bordeaux without delay. A second application should follow in 10 days or 2 weeks.

Okra Pests. Okra is rarely attacked by insects, and then only those of the leaf-eating class. The control is that given for cabbage worms (page 15).

Occasionally, okra leaves may be attacked by blight, a disease that destroys foliage. Control is to spray with Bordeaux mixture, beginning when first evidence of leaf spotting is seen. One application may be enough, but it is well to spray again after two weeks.

Corn Pests. Some insects that attack corn are the **corn ear worm** and the **corn root louse**. The corn ear worms feed on the silks and on the ear itself and sometimes prevent the filling out of the kernels. Sometimes their attack comes after the kernels are set and, even tho they consume but little, the appearance of the ears is marred. No wholly satisfactory remedy for control of the corn ear worm has been found. Clipping off the silks and shuck to the tip of the cob about 5 or 6 days after the first silks show signs of browning has given the best control of any method tried at the Kentucky Agricultural Experiment Station. The parts clipped off should be destroyed

immediately to kill the eggs or young worms attached to them. The use of poisons dusted on the silks has not given consistent control. Short-shucked varieties (Country Gentleman, for example) are most severely attacked; Howling Mob is somewhat less damaged because its shucks are longer.

The corn root-lice occasionally causes slowness of growth and general unthriftiness in corn by drawing the sap from the roots. There is no direct control of this insect but an indirect way is to destroy the ants which place the lice on the corn roots. The ant hills may be destroyed by fumigation with carbon disulfide. The procedure is to punch an inch hole deep into the ant hill, and pour in a tablespoonful of disulfide. Then, the hole is plugged with earth and the ant colony is "gassed."

A bacterial wilt, called Stewart's Disease, may attack all sweet corn but is particularly troublesome on Golden Bantam types. It causes severe stunting of the stalk growth. The disease may be avoided by using the "Cross" varieties bred to resist it.

GROUP 7. THE "WARM" CROPS. TRANSPLANTED

Vegetable and variety	Characteristics
Tomatoes	
Earliana	Earliest; quality fair; fruit red; size easily affected by unfavorable conditions.
Break O'Day	Wilt-resistant; same season as Earliana but quality better.
Bonny Best	Second early; quality good; fruit red, shapely; long cropper.
Pritchard	Wilt-resistant, same season as Bonny Best; fruits shapely, deep red; quality exceptionally good. Also called "Scarlet Topper."
Greater Baltimore	Midsummer; canning sort; high yield and long season; somewhat pale red.
Marglobe	Wilt-resistant; midsummer; red; high yield.
Stone	Midsummer; canning sort; deep red; high yield within short picking season.
Norton	Wilt-resistant; in other respects identical with Stone.
Ponderosa	Late; pink; quality exceptionally mild.
Peppers	
Ruby Giant	Fruits large, suited to stuffing; flavor mild.
Sunnybrook	"Pimiento" type; especially suited to canning; flavor mild.
Cayenne	"Hot" type, for relish and flavoring; fruits long.
Birdseye	"Hot" type; fruits small; for relish and meat sauces.
Eggplant	
Black Beauty	Intense black; weight 10 ozs. to 3 lbs.
New York	Deep purple; weight 1 to 4 lbs; prolific.

Seed for the vegetables in this group should be sown in hotbeds in February or March (see Kentucky Extension Circular No. 276). The seedlings may be reset in the bed 4 inches each way or merely thinned so they are not cramped. When all danger of frost is past, they are transplanted to the garden. The soil should be quite moist; if there is any question, it is advised to put a small amount of water deep about the plant roots; never on the surface around the plant.

All these are "fruit" crops, and the general fertilizing recommended (page 6) is well suited.

In small gardens, space may be saved by setting tomato plants as close as 2 feet in the row and pruning them to one or two main stems, supported on stakes driven at each plant. Apart from economy, this practice hastens fruiting and improves fruit size. Pruning consists merely of removing the suckers that arise at the base of each leaf, which later become branches. The stakes should be placed when the plants are set. As they grow, the stems should be tied to the stakes. The ties should be placed just below the fruit clusters, so loosely that the stems are not injured, but the cord (or strip of cloth) should pass twice about the stake to prevent slipping.

Tomatoes sometimes are injured by the **fruitworm** which bores holes in the fruit, rendering it worthless. There is no satisfactory means of control. Tobacco hornworms, sometimes troublesome on tomatoes, may be picked off by hand or poisoned with arsenical dust or spray (page 15).

Tomatoes and eggplants are subject to **blight**, which destroys the foliage and reduces the yield. An indirect damage to tomatoes is sunscalding of the fruit. The control for blight is Bordeaux mixture (see page 17). Four to six sprayings are suggested, the first while the plants are still in the bed, and the others at 10-day to two-week intervals, depending on rapidity of growth.

Another disease that attacks tomatoes is "**wilt**." This is often confused with blight. The difference is that blight causes the leaves to drop off one by one, beginning at the base of the plant, whereas wilt causes the whole plant to dry up, with the leaves still attached. Wilt occurs principally in gardens where tomatoes have been grown for a long time or where rotation has not been practiced. It is a soil disease and spraying or other plant treatment is ineffective against it. The control is to use wilt-resistant varieties such as Break O'Day, Pritchard, Marglobe, and Norton, in the order of earliness.

GROUP 8. THE "MELON" CROPS

Vegetable and variety	Characteristics
Cucumber	
Chicago Pickling	Exclusively for making pickles.
Long Green	For both slicing and making pickles; color especially deep green; fruits longer and slimmer than Chicago.
Davis Perfect	Ideal for slicing.
Summer Squash	
Scalloped White	Bush type; the early cymbling.
Summer Crookneck, and Straightneck	Running types; second early and midsummer.
Table Queen	Also called Acorn. May be used the summer thru as a cymbling, and stored for winter use.
Winter Squash	
Hubbard	Late; three kinds, warted and green and yellow; stores exceptionally well.
Cushaw	Late; quality high; stores well.
Cantaloupe	
Early Hackensack	Early; flavor good but lacking in piquancy.
Rocky Ford	The most popular cantaloupe; quality and flavor high; second early.
Hale's Best	Relatively new; excellent in quality and flavor; salmon flesh; large size; second early.
Tip Top	Late summer; large fruits; quality good.
Watermelon	
Kleckley Sweet	Long fruit; quality and flavor of the best.
Tom Watson	Cylindrical fruits; fair quality and flavor; somewhat drouth-resistant.
Stone Mountain	Roundish fruits; quality and flavor unsurpassed; exceedingly thin rind.
Irish Grey	Long fruits; light green color discriminated against in markets unacquainted with it; highly resistant to drouth and to blossom-end rot.
Wilt-resistant Stone Mountain	Wilt-resistant; identical with Stone Mountain.
Keckley Sweet Nos. 4 and 6	Wilt-resistant; identical with Keckley.

The "melon" crops are "fruit" vegetables and require an abundance of phosphorus. Because of their heavy vine growth, however, nitrogen is needed as well.

The generally accepted practice of growing these crops is in "hills" under which small quantities of manure have been put, and sometimes commercial fertilizers added. However, better results may be obtained by applying the fertilizers broadcast. The general fertilizing recommendation (page 6) is satisfactory.

Many cucumber and cantaloupe growers follow the method of sowing seed sparsely in drills and thinning the plants sufficiently to

leave a stand corresponding to that when the hill method of planting is used. The drill method of sowing provides better opportunity for pest control.

Early cucumbers and early cantaloupes are started in pots or beds, under the protection of frames (see Kentucky Extension Circular 276) and set in the garden after the ground has become warm, and danger of frost is past. The seed may be sown directly in the open garden after the ground has become warm and the likelihood of frost is over.

Pests. The insect enemies of this group are the **striped cucumber beetle**,* the **pickle worm**, and the **squash bug**; all serious pests. The cucumber beetle begins operations when the seedlings begin breaking thru the ground. These overwintering beetles enter the cracks in the soil and start feeding on the roots of the cucumber. At this season they lay eggs which hatch into cream-colored, brown headed larvae. These also attack the roots. Steps for control of the cucumber beetle must, accordingly, begin when the first beetles come. The best means is dusting with the following mixture:

Calcium arsenate, 1 pound; gypsum (landplaster), 15 pounds.

The first dusting should be a small handful of the mixture sprinkled over the hill when the ground begins to crack. This serves to keep away the adult beetles, and the material which falls about the roots, poisons the larvae. Following this, a series of dustings should be given, 3 days apart. Altho as few as 5 dustings may suffice, it has been found profitable to continue until 15 have been made. At each application it is advisable to dust the middle of the hill and the growing tips of the vines. No dust gun is needed; a device as simple as a cheesecloth bag or a perforated tin can serves.

The pickle worm hatches from eggs laid on the rind of the fruit, and burrows its way in. Since almost no surface feeding is done, poisoning the worm is not practicable. It has been observed that the adult prefers to deposit its eggs on squash blooms rather than on those of cucumber or cantaloupe. Growers may take advantage of this fact by placing hills of squash among the cucumbers or cantaloupes. Early White Bush squash is the variety best suited for this purpose. As soon as the squash are two inches in diameter, they should be picked and burned, thereby destroying the worms that may have entered. It is advisable to make repeated plantings so as

* Kentucky Extension Circular 262.

to provide a continuous supply of blooms to serve as "traps" throughout the summer.

The squash bug is a sucking insect, but it cannot be killed by contact sprays except in its younger stages, while its body is still soft. Tobacco and pyrethrum sprays are in some measure effective against the eggs and the younger stages, but the best method for controlling the adults is hand picking. If bits of shingle or trash are placed around the hills, under which the squash bug may take refuge for the night, the insects may be collected early in the morning, and destroyed.

Occasionally, plant lice become troublesome among the members of the "melon" group. The control is tobacco (see page 13).

The disease troubles of this group are wilt (of which there are two kinds) and several kinds of leaf-spotting diseases, collectively called "blight." For the wilt there is no control, but there are preventive measures worth taking. They are:

1. Insect control, for some forms of wilt are introduced and spread by insects, solely.
2. Crop rotation, for some forms of wilt accumulate in soil where melon crops are grown too continuously.

Several varieties of watermelons resistant to wilt have been developed, but they are subject to further improvement both in quality and in suitability for shipping. Of the Kleckley type, the best are Iowa King and Kleckley No. 4. Wilt-resistant Stone Mountain may be had, but altho its quality is acceptable, it is too soft in flesh for transportation a long distance.

"**Blight**" is the name given to several forms of leaf spotting diseases that affect the melon crops. The field control is spraying with Bordeaux mixture (see page 17). It is well to anticipate the coming of blight by beginning to spray when the plants begin to run, and giving them 2 to 5 sprays at 2-weeks intervals, thereafter. A preventive for some forms of blight is seed treatment, which is given as follows:

1. Dissolve one $7\frac{1}{2}$ grain tablet of mercury bichloride in one pint of water, using anything but a metal vessel.
2. In this solution, dip the seed for five minutes.
3. Wash it in two changes of water.
4. Spread out the seed so that it will dry quickly.

ONIONS

There are five ways to grow onions. They may be raised direct from seed; from slips raised in frames, and set; from "sets" or bulbs grown from seed the year before; from "top sets" of the "multiplier" sorts and from "bottom sets" or divided bulbs of the so-called "potato" onion.

Land for onions should be most fertile; even some gardens are not rich enough. Moisture is most important, too; onion land should be well supplied with humus. The best soil for onions is sandy loam, but the heavier soils may be made suitable by proper management. The way to begin is to turn under heavy sod or a green-manure crop, preferably top-dressed with stable manure. If the land is bare, the amount of manure should be greater; some commercial growers spread as much as 30 tons to the acre. Breaking should be as deep as possible, and seedbed preparation should be most thorough.

After growth has begun, additional feeding should be done. Nitrate of soda may be drilled, or sown by hand, down the rows, but not in contact. The rate is 200 to 300 pounds per acre. A second application a month after the first will not be amiss.

Cultivation should be continuous, to keep weeds removed. The working should never be deeper than 1/2 inch, and the surface should be kept level. One-half ounce of seed sows 100 feet of row.

Onions from Slips. Bermuda, Giant Silverskin and Prizetaker are the varieties raised from slips. They may be of the gardener's own growing, but usually it is more convenient to purchase them. The width of the row should be the same as for onions raised from seed, and the spacing in the row should be three to five inches. The slips should be set slightly deeper than they were in the seedling bed. The time for setting is the same as for sowing onion seed.

Onions from Sets. The onions raised from sets are usually of the Southport variety. The row-width should be the same as for other onions, and the "sets" should be spaced 1 1/2 inches to 3 inches, depending on whether they are to be used as "bunch" onions or fully ripe. There is considerable latitude in the setting time of this type of onion. They may be set in the fall under a ridge, and the ridge removed in late February or in March; then a very early crop of "green" onions results. If the maximum yield is desired, however,

spring setting is better and should be done as soon as soil conditions permit.

Multiplier Onions. The true multiplier is the Egyptian, or perennial tree onion, raised from top sets that follow the cluster of blossoms borne on the seed stalk that forms in June and July. Planting time is usually in August or September, altho some gardeners set their multipliers in the spring. To protect fall-planted sets from the cold, a heavy ridge is thrown over the row. This is raked off as early in the spring as there is likelihood of growth starting. This onion makes bulbs of fair size, but it is valued rather more as a "green onion." Some are always left standing to make top sets from which next year's crop is to be produced.

Potato Onion. The potato onion makes neither top sets nor seed but is produced from the bottom sets into which the bulbs divide, in the year after they have made table onions. The sets are planted at the same time and in the same manner as are the multipliers. In the spring, they produce green onions, or, let grow until August, large onions to use thru the winter. Large onions left in the ground or re-set, divide to make many small onions, some of usable size. These are the bottom sets from which the next year's crop is produced. Colors are red or yellow. Except in restricted markets potato onions do not compete with onions of other types but, because of their general hardiness and good keeping quality, they are favorites for home winter supply.

WINTER STORAGE OF VEGETABLES

To produce a surplus of vegetables for storing should be part of every gardener's plan. By a "storing surplus" is not meant a miscellaneous collection of whatever vegetables are left in the garden when the fall frosts come, but crops planted especially for storing. These are beets, carrots, squash, cushaws, cabbage, tomatoes sown in June; and turnips sown in August. Parsnips and salsify, sown in March or April, and sweetpotatoes and late potatoes complete the list.

Parsnips and salsify present no storage problem, for they may be left in the rows in which they grew. As for the others the ideal manner of storage is in a room built especially for the purpose, in which complete ventilation can be given and the correct temperature for the several kinds of vegetables maintained. Such a storage

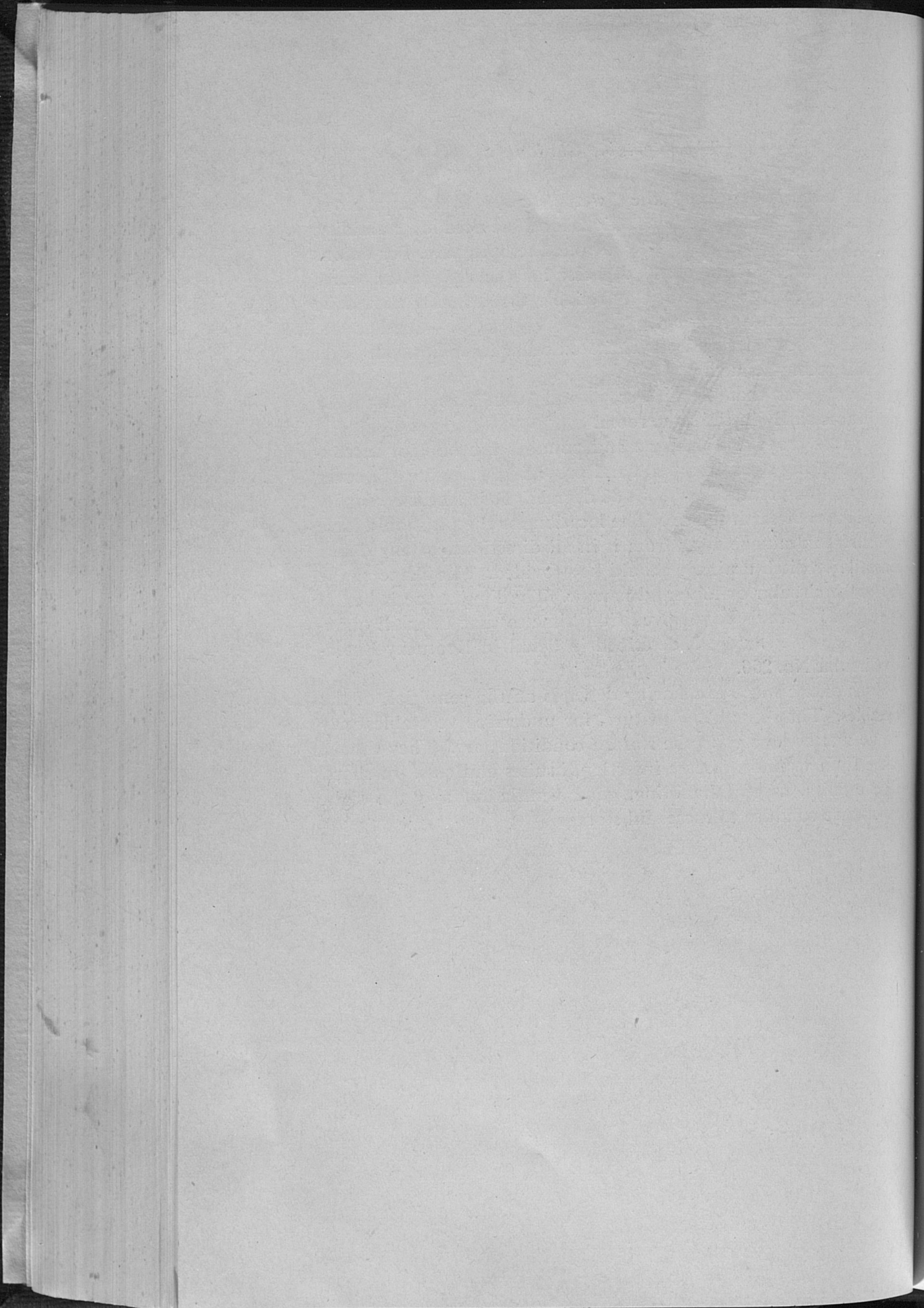
room is essential to keep the "warm" crops as sweetpotatoes, squashes, tomatoes, and perhaps onions for these need low humidity, good air drainage and carefully controlled temperature. For onions the temperature should be 40 degrees; for the rest of the warm crops 50 degrees is satisfactory. A reliable thermometer should be used for temperature readings.

For the "cool" crops a well-ventilated cellar room at about 36-40 degrees is recommended.

It is obvious that "warm" crops and "cool" crops cannot be stored successfully in the same room.

The root crops and cabbage and potatoes can be kept successfully by burying them in a "pit" and providing enough earth cover to keep the temperature at about 36 degrees. For Kentucky usually twelve inches of earth suffices. The location for the pit should have good surface drainage away from it in all directions. If any doubt exists, tile or ditch drainage should be provided. The shape of the pit may be circular or long and narrow. The long shape is best if the vegetables are to be removed from time to time in small quantities. Vegetable storage is described in detail in Kentucky Extension Circular No. 266.

Much of the success in storing depends on the condition of the vegetables. They should be mature, for underripe vegetables may wilt, no matter how good the storage conditions are. They should be free from wounds, disease infection, bruises and cuts. In short, prime quality, careful handling, good ventilation and the right temperature conduce to successful storage.



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