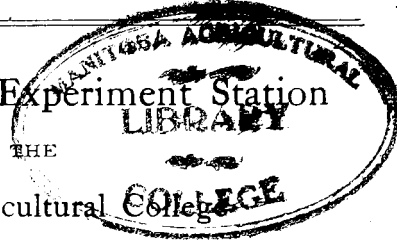


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THE HOME VEGETABLE GARDEN

(Revision of Bulletin 241)

By R. A. McGINTY



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THE HOME VEGETABLE GARDEN

By R. A. McGINTY*

Previous bulletins on the subject of vegetable growing have been out of print for some time, and from the numerous requests for information along this line, which are continuously being received by the Department of Horticulture, it has seemed advisable to re-publish the last bulletin on the subject, with such changes as experience and conditions appear to warrant.

It is the aim of this publication, as of its predecessor, to furnish the inexperienced gardener with such information as may aid him in growing a supply of vegetables for the home. The experienced gardener or the commercial grower of vegetables will find here very little that he does not already know. The many details of culture which are important to the latter must be omitted, but it is hoped that the information contained herein will enable the amateur gardener to plant and cultivate his crop more intelligently.

Certain sections of the preceding bulletin, as that on lettuce, have been enlarged to include some details and recent data, the importance of which is indicated by the many inquiries received.

THE PURPOSE OF THE GARDEN

The main purpose of the garden is, of course, to supply a quantity of fresh vegetables for the table during the growing season, but there are other purposes which the garden may be made to serve. These are to supply vegetables for canning and drying, and for winter storage.

There is a tendency with many gardeners to plant too many varieties of vegetables of a perishable nature and not enough of those kinds which may be stored successfully. Consequently, during the growing season, great quantities of such vegetables as radishes, lettuce, string beans, etc., go to waste, and when the fall of the year arrives, there are comparatively few carrots, onions, cabbage, and turnips to store for use during the winter. In some cases, the extra vegetables may be canned or dried, but, unless the aim is to do that, only what can be utilized should be planted.

WHAT TO GROW IN THE GARDEN

Whether the garden is located in the city or in the country will determine to some extent the kind of vegetables that should be grown. In the country, where space is not limited, anything which the gardener fancies

*The author wishes to acknowledge his indebtedness to Dr. E. P. Sandsten for many helpful suggestions, and for the portion of the bulletin relating to potato growing.

may be grown. In the city, however, the garden spot is usually small, and it is necessary to forego the pleasure of growing those vegetables which take up considerable room. Squashes, melons, cucumbers, and sweet corn take up a large amount of space in comparison to the quantity they produce, and should, therefore, be left out of the small garden. Small gardens are usually located where space is valuable, and should, therefore, be cultivated intensively. By so doing, they may be made very profitable.

Individual taste will, of course, determine, in great measure, the kinds of vegetables grown, but the gardener should endeavor to provide a continuous supply of a good variety of those which he prefers, both for summer and winter use.

LOCATION OF THE GARDEN

The city gardener has little choice in the matter of location—he must use what is available—but where space is less limited, a location having the following features is desirable: Near as possible to the house, for convenience; a southern or southeastern slope, for warmth and drainage, with buildings or trees on north and west sides for protection.

SOILS

Somewhat sandy soils are preferable for vegetables for several reasons. However, the soil may be easily modified by proper treatment, and no one should be discouraged because he does not happen to have just the right type.

Sandy soils dry out earlier in the spring, are warmer, more easily worked, do not become so hard from tramping, and in general produce earlier crops than the heavier clay soils.

If the soil is inclined to be too sandy, the addition of stable manure will cause it to hold water better, while, on the other hand, a clay soil is made lighter and more friable by the application of manure.

FERTILIZERS

Stable manure should be the chief dependence of the gardener for plant food material and should be applied at the rate of 15 to 30 tons to the acre in the fall before the ground is worked. If applied in the spring, it should be well decayed in order that the elements needed by the plants may be in available form.

Other kinds of manure besides stable manure are sometimes used. Cow manure used exclusively has a tendency to cause the soil to become compact and hard; sheep, chicken, and hog manure are concentrated forms that should be used somewhat sparingly and with care. Compost made of decayed leaves, plants, and other vegetable matter is valuable for applying to soils lacking in humus. No diseased plants should be used in making the compost. Wood ashes contain important elements of plant food and should be saved. Coal ashes, however, have no value as a fertilizer.

PREPARATION OF SOIL

The ground should be plowed or spaded up in the fall, if possible (an application of manure having been made previously), and left rough over winter. The depth to which the ground is broken should be sufficient for the development of long-rooted crops, such as carrots, parsnips, and beets. Usually six to ten inches is about the right depth. In the spring, the ground is simply harrowed or raked smooth when ready to plant.

When the soil cannot conveniently be prepared in the fall, it may be done in the spring. One advantage of fall preparation is that there are often two or three days in the early spring when such vegetables as onions, turnips, radishes, etc., may be planted, but not enough nice weather both to prepare and to plant the ground. Perhaps by the time the ground can be put in shape for planting, and before actual planting can be done, unfavorable weather sets in, and the ground is not in condition again to plant until too late for best success with vegetables that require early planting. Also, the action of the weather during the winter breaks up any clods and leaves the ground in good physical condition.

The importance of thorough preparation cannot be over-emphasized. A plot of ground properly prepared is easily and satisfactorily handled throughout the season, while a poorly prepared garden is difficult to handle, and not apt to give satisfactory results.

PLANNING THE GARDEN

In order to make the best use of the land devoted to the garden, it is well to make a planting plan on paper some time in advance of the date for sowing the first seeds. This plan should show the number, location and distance apart of the rows of vegetables, so that at planting time the work can proceed without delay. The different crops should be grouped somewhat according to their cultural requirements and length of season required to mature. By grouping together such crops as lettuce, radishes, spinach, etc., which require a short season, the ground may be utilized for planting another crop after these are out of the way. By planning ahead, the portion of the garden devoted to cabbage or cauliflower may be made to produce a "companion crop" of green onions. If the cabbage rows are to be $2\frac{1}{2}$ feet apart, plant the onions as early as the ground can be worked, placing the rows half way between where the cabbage rows will be planted later. The cabbage plants will be set out sometime later, and before they need all the room the onions will be gathered and out of the way. Radishes, lettuce, and beets are also often grown as companion crops.

Where horse cultivation is to be practiced, the rows should run the long way of the garden, so as to avoid turning as much as possible. In the small garden, where most of the cultivation is by hand, this is less important.

ROTATION OF CROPS

The same varieties of vegetables, or those closely related, should not be grown in the same part of the garden year after year. It is a good idea to

follow root crops with those which bear their edible parts above ground, or vice versa. In this way, many plant diseases and insect pests may be avoided.

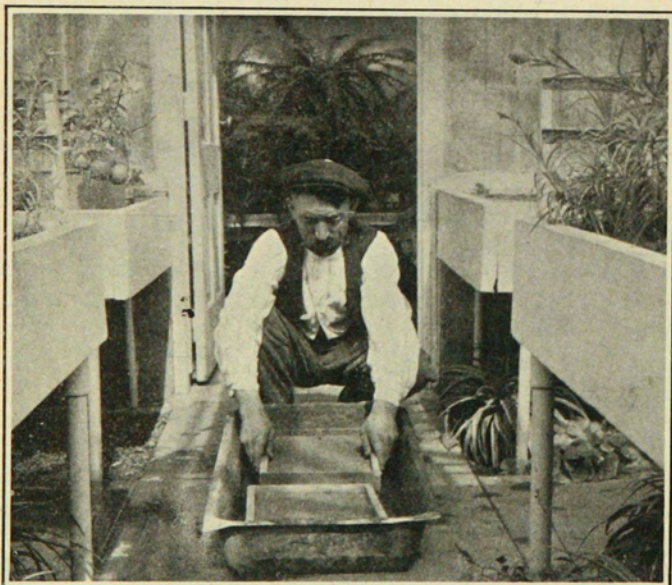
If the crops have been grouped as suggested, about all that is necessary for rotation is to shift the groups.

GARDEN SEED

In most of the larger towns and cities, there are reliable seed stores which carry good seed of the standard varieties of vegetables. In the smaller towns, however, it is often impossible to get dependable seed at home. In such cases, it is recommended that the gardener order seed from some well-known seed house.

It is not often advisable for the gardener to try to save his own seed unless he is familiar with the principles of plant breeding. Such seed is usually more or less impure, and, therefore, not the most desirable kind for planting.

Seedsmen advertise very widely certain "novelties" and "new creations," which appear to have superior qualities, but it is best for the gardener to plant standard, well-proven varieties for the most part, and leave the novelties alone until they have been well tested.



A good method of watering seed-boxes. The soil soaks up the water from below, and thus avoids disturbing the surface. May be used in watering plants which have just been transplanted into boxes.

Only good seed, of course, should be used in planting. Seed which is too old or that has been injured in any way should be thrown away. When

there is doubt as to the power of seed to germinate, it should be tested at home, or a sample sent to the Seed Laboratory, Colorado Agricultural Experiment Station, Fort Collins, Colorado, where it will be tested free of charge.

It is important that the supply of seed be ordered some time in advance of the planting season, so as to be sure of getting the desired varieties and to avoid any delay in planting.

Those who have grown but few vegetables often find trouble in estimating the quantity of seed necessary to plant the garden, and either buy too much or too little seed. Accordingly, the table above is given, showing amount of seed and plants necessary for 100 feet of row, together with planting distances.

PLANTING TABLE

Amt. of Seed Required and Distance Apart of Plants and Rows

VEGETABLES	100 Ft. of Row		Distance Apart of Rows		Distance Apart
	Seed	Plants	Horse Cultiv.	Hand Cultiv.	Plants in the Row
Beans	1 pt.		2½ ft.	1½-2 ft.	3 in.
Beets	2 oz.		2½ ft.	1½ ft.	2 in.
Brussels Sprouts ..	¼ oz.	80	2½ ft.	1½ ft.	18 in.
Cabbage	¼ oz.	65	3 ft.	2½ ft.	18 in.
Carrot	1 oz.		2½ ft.	1½ ft.	2 in.
Cauliflower	¼ oz.	50- 65	3 ft.	2 ft.	1½ ft.
Celery	¼ oz.	200	3-5 ft.	2½ ft.	6 in.
Corn, Sweet	½ pt.		3½ ft.	3 ft.	1 ft.
Cucumber	1 oz.		5 ft.	4 ft.	2-4 ft.
Kohlrabi	¼ oz.		2½ ft.	1½ ft.	1 ft.
Lettuce	¼ oz.	125-200	2½ ft.	1½ ft.	6-10 in.
Muskmelon	1 oz.		6 ft.	5 ft.	3-5 ft.
Onion Sets	1 qt.		2 ft.	15 in.	2-3 in.
Onion Seed	½ oz.		2 ft.	15 in.	2-3 in.
Parsley	½ oz.		2 ft.	15 in.	4 in.
Parsnips	½ oz.		2½ ft.	1½ ft.	3 in.
Pea	1 qt.		3 ft.	2 ft.	1 in.
Pumpkin	½ oz.		6 ft.	5 ft.	4 ft.
Radish	1 oz.		2 ft.	1½ ft.	1-2 in.
Salsify	1 oz.		2 ft.	1½ ft.	2 in.
Spinach	1 oz.		2 ft.	1½ ft.	2 in.
Squash, Late	½ oz.		7 ft.	5 ft.	3-6 ft.
Tomato	½ oz.	35- 50	4 ft.	3 ft.	2-4 ft.
Turnip	½ oz.		2½ ft.	1½ ft.	3 in.
Watermelon	½ oz.		8 ft.	6 ft.	3-8 ft.

HOTBEDS AND COLDFRAMES

Full details of making and handling hotbeds and coldframes may be found in Bulletin 221, Colorado Experiment Station, Fort Collins, Colorado. Every gardener who can should have one or both of these structures in order to secure such plants as tomatoes, cabbage, cauliflower, etc., for transplanting and to grow early crops of such vegetables as radishes and lettuce. A post-card request will bring the bulletin to you.

TIME OF PLANTING

In view of the varying conditions of climate, altitude, and latitude, it is not practicable to give planting dates for all parts of Colorado. The following, therefore, are given as the approximate dates for planting in the

vicinity of Fort Collins. The time will vary north and south of this point and also as regards altitude. Approximately ten days difference may be allowed for each 1,000 feet of altitude and 100 miles of latitude.

It is necessary, in the case of many vegetables, of course, to start the plants inside during March or April. In order to do this, some place where the temperature can be controlled is necessary. Hotbeds, coldframes, small greenhouses, and even well-lighted windows on the south side of the house are suitable for this purpose.

March 1st to 15th

Sow seeds of the following in shallow boxes of light soil and grow in a warm living room or hotbed. After plants have developed three or four leaves, transplant into other boxes, putting plants about two or three inches apart each way: Cabbage, celery (for early crop), cauliflower, tomatoes. Details regarding the handling of these plants are given in the bulletin on hotbeds and coldframes mentioned above.

April 1st

Outdoors: Plant one-year-old roots of asparagus; divide old roots of rhubarb and plant; plant root cuttings of horseradish; put out onion sets.

Indoors: Sow seeds of brussels sprouts; celery (for late crop).

April 15th

Sow seeds of the following in the field: Lettuce, radishes, kohlrabi, onions, parsley, peas, spinach, turnips, parsnips, salsify.

April 25th

Plant in the field: Beets, carrots, cauliflower plants, Swiss chard, cabbage plants, celery plants (for early crop).

May 15th

(After danger of frost is past.)

Plant in the field: Beans, sweet corn, tomato plants, melons, cucumbers, squashes, brussels sprouts plants.

SOWING THE SEED

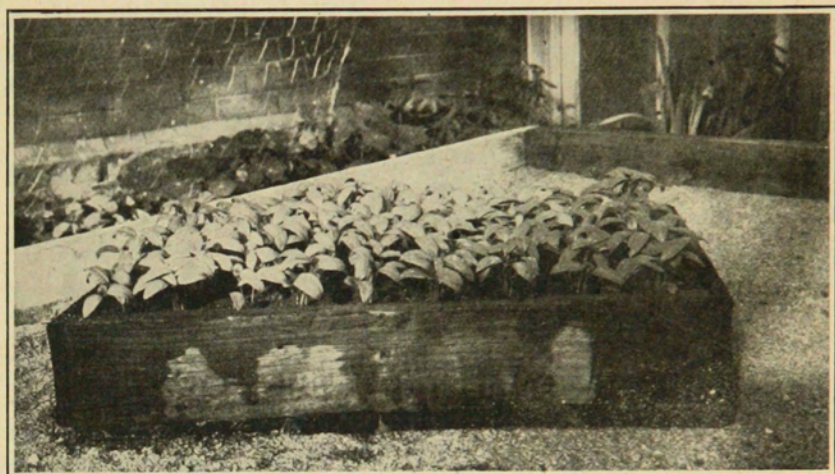
It is very essential in planting garden seeds that the soil be in the best possible condition for working. In order to germinate, the seeds must have sufficient moisture and must come in close contact with the soil particles. Therefore, the soil must be as free as possible from clods and not too dry.

If the soil becomes too dry before planting, it will be necessary to irrigate in order to cause the seed to germinate. This should be avoided as far as possible, especially with the smaller seeds, but, if necessary, the water should be applied in a furrow slightly to one side of the row.

In large gardens, there is an advantage in sowing seeds with a seed drill, but in the small garden it is more expedient to sow them by hand. Most seeds, the small ones especially, should be planted more thickly than

the plants will stand later, because some of the seeds will fail to germinate. If too many come up, they are thinned out.

Furrows for planting should be made as straight as possible, not only because they look better that way, but because cultivation and irrigation can



Seedlings which have been grown indoors in seed-box—ready to transplant

be better and more satisfactorily done while the crop is growing. It is well to use a line in laying out the rows, if it can be done conveniently. For small seed, such as radish, lettuce, onion, carrot and parsnips, the mark made by drawing the end of a rake or hoe handle along a stretched line is deep enough for planting. Beans, muskmelons, and cucumbers should be planted about an inch deep, while peas and corn may be planted at a depth of two or three inches.

After the seeds have been covered, the soil over them should be slightly compacted to bring the soil particles in close contact. This may be done with the back of a hoe or rake, or by putting a long narrow board directly over the row and walking on it. Seed drills have a small wheel behind which presses the soil over the seeds somewhat.

THINNING

It is important that most vegetables be thinned, in order to secure normally developed plants. Thinning should usually be done about the time three or four leaves have developed so that the young plants will not grow too spindly by being crowded.

Radishes are usually thinned by pulling and using those which have developed sufficiently, leaving the others to grow for a longer time. Lettuce is sometimes treated the same way, but head lettuce should be thinned when the plants are small, otherwise good heads will not develop. Young beet thinnings are ordinarily used for greens. In thinning onions, those removed

are often used as green onions and those which remain are allowed to mature, but thinning should not be postponed too long, or the mature onions will be small.

The strongest plants should always be left in thinning and enough room given them to develop properly.

SETTING PLANTS IN THE FIELD

The seeds of tender vegetables requiring a long growing season cannot be planted in the field early enough to produce a crop. Consequently, such crops must be started in March or April in hotbeds or greenhouses, or in some place where temperatures can be controlled and the plants set in the open after danger of frost is past. Plants can be grown at home or obtained from greenhouses or from people who make a business of growing them. Such plants should be vigorous, thrifty, and properly hardened off, so that when set in the field they will continue growth with as little delay as possible.

Transplanting is preferably done on cloudy days or late in the afternoon. The plants are usually set at the edge, or slightly within the furrow through which the irrigation water is to be run. Irrigation should follow immediately after planting so that the plants will not wilt too badly. The soil should be pressed firmly around the roots in transplanting, but it is a good idea to have a little loose soil on the surface, around the stem, to prevent baking and evaporation.

A few hours before transplanting, it is a good idea to give the plants a thorough watering in order that their tissues may be full of water when they are set out. Cabbage plants, and others having large leaves, should usually have about one-half of their leaf surface removed to prevent them from wilting. The plants should be set somewhat deeper than they stood in the seedbed or box. Shading is practicable where only a few plants are involved, but the shade should be removed after two or three days.

CULTIVATION

If the garden is properly prepared to begin with, cultivation during the growing season is a comparatively simple matter, consisting of keeping surface soil well stirred and preventing weed growth. In the small garden, the cultivation will be done by hand; hoes, rakes, and hand-wheel hoes being used. The latter are very serviceable implements and one should be owned by every gardener who can afford it. The farm garden, being on a larger scale, should be cultivated for the most part with horse-drawn cultivators, those of the seven and twelve-tooth types being desirable for the purpose.

Cultivation, as a rule, should be shallow and frequent. A depth of two or three inches is about right, and once every ten days is none too often to give the ground a good stirring. After each irrigation, as soon as the soil is dry enough, the irrigation furrows and surface soil should be cultivated, in order to conserve the moisture which has just been applied, and to prevent baking of the surface of the ground.



Transplanting seedling tomato plants from the seed box (at right) into another box of similar size. The plants are being put about four inches apart each way

The gardener should continue to cultivate throughout the season. In early spring, he is usually enthusiastic and gets the garden started in good shape, but, as the summer advances, he loses some of his ardor and very often allows it to grow up to weeds. Consequently, he fails to reap a large part of the benefit which would have come had he persisted in giving it proper attention until the end of the season.

IRRIGATION

While the various vegetables require different amounts of water, it is thought advisable to treat the matter in a general way to avoid useless repetition. Vegetables contain from 85 to 90 per cent of water, so it is very necessary that they have plenty of moisture. The soil in which the plants are growing should be moist at all times, and the plants should never become wilted or checked for lack of water. This condition is best maintained by thorough but not too frequent irrigation. The soil should be wet to a good depth and then not irrigated again until needed. This causes the plants to send their roots deeply into the soil, and economizes the use of water. Frequent, light irrigations induce a shallow root system, so that plants are much more easily affected by dry weather.

Water should be applied by running it in furrows as close to the plants as is convenient. Except on some sandy soils, a fairly small stream of water is preferable, and it should be allowed to run for six to twelve or more hours, depending on the character of soil and other conditions. Where

a garden is irrigated with a lawn sprinkler, the tendency is always to give too little water. The soil appears to be wet when in reality it is not. If this method is used, the garden should be thoroughly soaked and not sprinkled again for a week. Small sprinklings every day or two will cause the plants to be shallow rooted.

GARDEN INSECTS AND DISEASES

At the time of writing this bulletin, there are no bulletins of this Station dealing with insects and diseases of the garden available for distribution with the exception of the following:

Bulletin No. 271, "The Mexican Bean-Beetle."

Bulletin No. 259, "Colorado Plant Diseases."

This may be obtained by addressing a post card to the Experiment Station, Fort Collins, Colorado, and should be of value in localities where this pest is prevalent.

Every gardener who has, or anticipates, any trouble with insects or plant diseases should obtain Farmers' Bulletin 856, "Control of Diseases and Insect Enemies of the Home Vegetable Garden," from the Superintendent of Documents, Government Printing Office, Washington, D. C.

The original supply of this bulletin has been exhausted, but it may still be obtained by remitting ten cents to the Superintendent of Documents.

ASPARAGUS

If the plants used are purchased from a seedsman, good one-year-old plants should be procured. One may grow very satisfactory plants from seed. The seed is gathered when ripe and put in water in order to soften the pulp which surrounds them. They are mashed up and the hard seed worked out, washed, and dried. They are stored during the winter and planted in the spring. The rows should be two and a half or three feet apart to permit horse cultivation and the seed planted one to two inches apart in the row and about one inch deep. These plants will be ready for transplanting the following spring. If one does not care to save his own seed it may be purchased from reputable seed houses.

Asparagus plants are either pistillate or staminate, the former producing seed while the latter do not. It has been shown by experiment that the staminate plants produce the largest crop, and these should be used when possible. It is hard to distinguish between the male and female plants before the end of the second year, when the seed are produced for the first time. Therefore, if plants are left in the seedbed until two years old, they may be separated and only the male plants (those which bear no seed) used for planting.

When ready to set out the plants, trenches or furrows four and one-half or five feet apart and six to seven inches deep are made in the field, and plants set in the bottom of the furrows about two feet apart. When set, the plants are covered with two or three inches of soil. The furrow is not entirely filled at the time of planting, but this is done gradually during

cultivation. To grow blanched asparagus, the plants are usually set a few inches deeper.

Clean cultivation is given during the summer, and before winter comes, the tops should be cut off and burned, after which a mulch of well-rotted manure three or four inches deep should be put over the bed. This prevents alternate freezing and thawing during the winter, which is detrimental to the plants. Manure which is free from weed seeds is best, and it may be worked into the soil in the spring.

Cultivation begins the following spring as soon as the ground can be worked and is kept up throughout the summer. None of the young shoots should be cut the second spring, as the plants will be much stronger if left undisturbed until the third spring. The crop is given practically the same culture each year. Shallow cultivation is the rule during the summer, and the old stalks are cut and burned after the berries have turned red. This is followed by the mulch of mature late in the fall. When the first shoots appear the third spring the soil is thrown toward the plants, hilling them up slightly. This is particularly desirable if bleached asparagus is to be grown. Soon after this, cutting of the young shoots begins, and they are kept cut clean for six or seven weeks. After this, the shoots are allowed to grow in order to provide for next year's crop.

The shoots are cut with a knife, or they may be broken off just below the surface of the soil, after they have attained a length of six or eight inches.

In growing bleached "grass," the rows are hilled up, and when the tips of the shoots appear before the surface of the ridge, they are cut off several inches below the top of the ground.

Varieties.—Some of the best varieties of asparagus are Conover's Colossal, Palmetto, Giant Argenteuil, and Columbian (Mammoth White).

A new strain of asparagus, known as the Washington strain, has recently been developed by the U. S. Department of Agriculture, and has been the subject of much favorable comment. This variety of strain is now listed by a number of seedsmen and plants or seed may be obtained from them.

BEANS

Types of Beans.—There are several types of beans, but the two of the most importance to the average vegetable grower are the kidney and Lima beans. From the former come our ordinary string or snap beans, while the large, flat-seeded kinds belong to the Lima type.

Culture of Snap Beans.—Beans are tender plants and cannot be planted until danger of frost is past. When ready to plant, make rows two and a half feet apart and plant the seed two or three inches apart in the row. Six inches would probably be the best distance if a perfect stand could be obtained. Beans planted this way will produce larger yields than when planted in hills eighteen inches or more apart. Plant the seed not more than two inches deep, and one and one-half inches is better.

Shallow cultivation should be given frequently during the growing period of the crop.

Culture of Lima Beans.—Lima beans require a longer season for maturing than snap beans, and, since they are more tender, should be planted a few days later. Plant the seeds about four or five inches apart in rows three to three and one-half feet apart, covering them with one to two inches of soil. Limas require about the same cultivation as snap beans.

Beans should not be cultivated when the plants are wet from dew or rain, as this may cause them to become diseased.

Varieties of Beans.—Snap beans: Stringless Greenpod, Bountiful, Red Valentine, Rust-proof Golden Wax, Refugee Wax.

Lima beans: Fordhook Bush Lima, Henderson's Bush Lima.

BEETS

There are four distinct types of beets: (1) The ordinary garden beet; (2) Swiss chard, the so-called leaf beet; (3) the sugar beet; (4) the mangel, or stock beet. Vegetable growers are concerned only with the first two.

Because of the roughness and irregularity of beet seed, they are handled with difficulty by the various seed drills, but on a large scale they must be handled by machines. Some modifications of the ordinary seed drill enable this to be done. In the average garden, the best method is to plant by hand. The seed should be sown three-fourths to one inch deep, and where the crop can best be harvested all at one time, the plants should be thinned to stand from three to six inches apart in the rows, which are made eighteen to twenty-four inches apart. For the home or local market garden, it may not be necessary to thin the plants, but allow the largest ones to reach edible size, say one and one-half to two inches in diameter, when they are removed to make room for the others.

Beets for winter storage should not be planted until the middle of June or later as those planted earlier become tough and woody before time to harvest them in the fall.

Varieties.—Crimson Globe, Crosby's Egyptian, Detroit Dark Red, Eclipse, Columbia, Dark Stinson.

Swiss Chard.—This type of beet does not produce a thickened root, as do the others, but is grown for the leaves and the thickened leaf stalks, which attain the size of rhubarb leaves. The young leaves are often boiled the same as spinach, while the leaf stalks may be cooked and served in the same manner as asparagus. In cultivation, it requires about the same conditions as the beet, but more room should be allowed between rows and between plants in the row.

Swiss Chard is a vegetable which deserves to be more extensively cultivated than it is at present. Giant Lucullus is the chief variety.

BRUSSELS SPROUTS

Brussels Sprouts is the name given to one of the variations of the cabbage. While the stem and leaves resemble those of the cabbage it does not form one large head, but a number of small heads in the axils of the leaves.

Brussels Sprouts require about the same soil and climatic conditions as cabbage. The natural season of the vegetable is late fall, and this is the time when it reaches its best development. The plants should be started in April and transplanted to their permanent locations about the middle of June.

When the small sprouts begin to form, the leaves along the stalk are cut off to allow them to develop to good size. A certain amount of frost is thought to improve the quality of Brussels Sprouts.



Trimmed heads of cabbage are Copenhagen Market, Cauliflower is Snowball. These vegetables grow to perfection in Colorado. Note Savoy cabbage in center

CABBAGE

For the early crop, the seed should be sown in the hotbed in March, and, if possible, transplanted once before they are finally put in the field. They are put out in the open as soon as the weather will permit, say in April. When properly hardened off, the plants will stand considerable frost. The seed for the late crop, for winter use, may be planted in beds outside about June 1st, and the plants are transplanted to their permanent positions when they have attained sufficient size.

The leaf area of cabbage plants should be reduced one-third or one-half when transplanted so that transpiration, or evaporation of water through the leaves, will not be so great. This is accomplished by gathering the leaves

of the plants together and shearing off the upper portion, being careful not to injure the buds.

Plants of the early varieties should be set in the field in rows $2\frac{1}{2}$ feet apart, the plants being placed 15 to 24 inches apart in the row. In the case of the late varieties, the plants should be further apart each way, as they require more room for development.

Frequent cultivation is necessary for the best development of cabbage. There is an old saying that "cabbage should be cultivated every day." It seems to be benefited by shallow cultivation, even in very dry weather, when there is already a dust mulch over the area. Such culture retains moisture and keeps down weeds. Cultivation should be continued as long as the leaves will allow passage between the rows.

For information on storage of cabbage see the latter part of this bulletin.

Varieties.—Early: Jersey Wakefield, Copenhagen Market, Charles-town Wakefield. Late: Flat Dutch, Danish Ballhead.

CARROTS

The carrot is usually considered a vegetable of secondary importance, but is grown to some extent in almost every garden and is becoming more popular all the time. In addition to its use as a vegetable, it is a valuable stock feed, and the large quantities produced per acre are responsible for its extensive culture as a farm crop.

For early use, carrots may be planted as soon as the ground can be worked, but some should be planted in June to be in prime condition for winter storage.

Carrots are given much the same culture as beets. The seed is sown thinly, about $\frac{1}{2}$ inch deep, in drills 18 to 24 inches apart. The plants are thinned, if necessary, and all weeds are kept down, especially while the plants are very young, as they are easily smothered at that stage. Carrots are ready to use when $\frac{1}{2}$ inch or more in diameter.

Varieties.—Chantenay, Oxheart, Danvers Half-Long.

CAULIFLOWER

This is another variation of the cabbage and is grown for the thickened flower stems or curd, which forms a white, compact head.

Cauliflower does not thrive in hot, dry weather, so it should be grown either as an early or late crop. For the early crop, start the plants in the greenhouse or hotbed in March, and, when they have four or five leaves, transplant, giving more room. Set the plants in the field when severe weather is past. The distance between plants should be about 18 inches in the row, and about $2\frac{1}{2}$ to 3 feet between the rows.

For the late crop, the plants should be started in May and finally transplanted to the field about July 1st.

Frequent shallow cultivation is given throughout the growing season. One of the essentials to successful cauliflower growing is never to allow the plants to become checked in their growth.

When the head or curd begins to form, care must be taken to prevent it being discolored or injured by insects. This is accomplished by folding the outer leaves over the head and tying them in place, or by breaking two or three leaves over the head. The seed is always expensive, but it pays to secure the best obtainable. Cauliflower is one of the vegetables which may be expected to do well at elevations of 6,000 to 8,000 feet.

Varieties.—Burpee's Dry Weather, Early Snowball, Dwarf Erfurt.

CELERY

Soil.—A moist loamy soil containing an abundance of vegetable matter is best suited to celery growing. It is better if the water table is only 3 or 4 feet below the surface, and, for this reason, the river bottoms of Colorado are best adapted to the crop. But celery may be grown profitably on higher land where the necessary moisture can be supplied by irrigation. The climate of the state is well suited to the growing of celery. It delights in our cool nights and bright days.

Seed-bed.—The growing of the plants in the seed-bed is one of the most exacting operations connected with celery culture. The seed are small and slow to germinate and great care in watering and shading is necessary for good results. The soil in the seed-bed should be fine and rich. For the early crop, the seed should be planted in hotbeds the first or second week in March, while that for the late or main crop may be planted during the early part of April. The seed should be covered very lightly, say about a quarter of an inch and sometimes sand is used for this. Between the time of planting and the appearance of the young plants is a critical period. The surface of the soil should not be allowed to become dry, but large quantities of water cannot be applied. The beds should be watered with a fine spray, two or three times a day, if necessary. When the plants are very young, shading on warm sunshiny days may be desirable. Cloth or lath screens will serve for this. When the plants are large enough to handle, they should be transplanted, if it is possible to do so. They may be planted in beds with 2 inches between plants each way. This method gives much more stocky plants and a much better developed root system.

Setting the Plants in the Field.—For the early crop, the plants will be ready to set in the field in May, and for the late crop the latter part of June. The bed should be given a thorough wetting before removing the plants, and if they have made a vigorous growth, it will be advisable to cut the tops back slightly, in order to reduce transpiration. Rows should be laid off the proper distance apart and water run through the furrows for a short time. A water line is thus established along the sides of the furrow and plants set along this line will neither be flooded out or left dry when water is again turned into the furrow. If double rows are used as mentioned below, plants are set on both sides of the furrow, but if the single row is used they are set on only one side. Usually a small dibble is used to make the holes in which the plants are set and for pressing the soil around the roots.



A good way to blanch the easy varieties of celery. The green varieties, such as Giant Pascal, should be blanching with soil

A good irrigation should follow immediately after the plants are set.

Distances to Plant.—The distances at which the plants are set depends largely on the method of blanching. There are several methods of blanching employed. The most common one for late celery is that where the plants are banked up with earth. In this case, the rows are made four or five feet apart and the plants set 6 inches apart in the row. Frequently with early celery, double rows, 10 or 12 inches apart, with about 4 feet between the double rows, are planted and the celery is blanching with boards about 12 inches wide and 16 to 20 feet in length, or old newspapers may be used. The papers are wrapped around the individual stalks and tied with twine near the ground and close to the top.

Cultivation.—Frequent surface cultivation should be the rule with celery. The plant needs abundant moisture and everything possible should be done to retain moisture in the soil. In irrigating, a thorough wetting should be given and then water should be withheld until it is needed again. The grower must always keep in mind, however, that the plant requires a large amount of water.

Celery plants must never be allowed to become checked if possible to prevent it, as checking injures the quality and is apt to cause the plants to run to seed.

Blanching.—The methods of blanching celery have already been outlined. When the crop is blanched by means of boards, 20,000 to 30,000 feet of lumber are required for blanching an acre. If all the celery is not needed at one time, the same boards can be used for blanching two or three lots, so that less than the above will be required per acre. The time for blanching is from ten to thirty days. The early crop usually requires less time than the late crop. The plants should not be allowed to stay in the field after blanching, as the quality is injured thereby.

When the crop is blanched with earth it is almost always of better flavor than when other methods are employed. The banking up of the soil around the plants may be done by hand or a celery "hiller" may be used. This is a plow having large moldboards which banks the soil against the plants. Before it is used, a small amount of soil must be placed around the base of the plants to hold them in an upright and compact position. When celery is to be kept in storage for some time it is not best to blanch it in the field. If stored in a dark cellar or trench blanching will take place there. Frequently the blanching is begun in the field by banking the soil partly up around the plants and the process is completed in storage. Celery handled in this manner will keep better than if thoroughly blanched before storing. Both the cellar and trench methods of storing celery are described in that portion of this bulletin relating to storage. The trench method is the more commonly used method in Colorado.

Varieties.—Early: Golden Self-blanching. Late: Giant Pascal, Winter Queen, White Plume.

SWEET CORN

Sweet corn is not as well adapted to Colorado conditions as many other vegetables, but sufficient quantity for home use can be grown in the ordinary garden, except at the higher altitudes where the frost-free period may not be long enough to allow it to mature. The early varieties will often mature in sections where later ones will not.

Rows should be laid off about 3 feet apart and the seed planted so as to have the plants 8 to 10 inches apart in the row. Another method is to plant in hills 3 feet apart each way, leaving about three plants in a hill. The seed are planted 1 to 1½ inches deep. Growers often take a chance with early corn and plant earlier than the normal season. Then, if the crop escapes frost, it matures earlier and is correspondingly valuable. If it is killed or fails to come up on account of the seed rotting, it may be planted again. In the home garden, in the warmer portions of the State, it is well to have a succession of plantings in order to supply the table for a considerable period.

Sweet corn is in the proper stage for gathering when the grains are plump, well developed and just entering the dough stage. It should not be gathered for the table or for canning more than two or three hours before it is cooked, as the quality is injured by keeping longer than this. The ideal

stage of sweet corn on the stalk is of short duration, and it should be pulled at the proper time.

Varieties.—Early: Golden Bantam, Extra Early Adams, Peep-o'-Day.
Late: Stowell's Evergreen, Country Gentleman.

CUCUMBERS

Since the cucumber is a tender vegetable, the seed cannot be planted until after danger of frost is past. Rows are laid off about 6 feet apart and the seed planted in hills 3 feet apart in the row. Six or eight seed should be planted in a hill and when the plants are well established all but two or three are thinned out.

In order to produce plants early, thus allowing for a longer growing period, the seed may be planted in strawberry boxes or paper pots in the hotbed about the middle of March and transplanted to the field when there is no longer danger from frost. Cucumber plants do not transplant readily by the ordinary method, but when put in strawberry boxes or pots a mass of soil adheres to the roots and they can be transplanted without any difficulty. The boxes, which will have become more or less rotten, can be easily broken away from the enclosed soil.

In order to keep the vines growing and bearing, the cucumbers must not be allowed to ripen. For slicing, they are picked when 6 to 8 inches long; but before the seeds become hard, while for pickling, they are removed when they have attained the desired size. Usually the smaller the fruit the more desirable it is for pickling.

Varieties.—White Spine, Davis Perfect, Boston Pickling.

EGG PLANT

The egg plant requires a warm, loamy soil and a long, warm season to grow to the best advantage. In Northern Colorado, the season is too short to allow the crop to mature if the seed are planted in the field, so that every advantage must be taken to prolong the growing period. The seed may be planted about March 15th in the greenhouse or hotbed in strawberry boxes or pots and treated much like cucumbers started by this method. They may be planted in flats and transplanted to pots when two true leaves have developed. By doing this, the plants are of good size when the time comes for setting them in the field. Before finally planting them in the field, they should be hardened off in the cold frame.

The seed and young plants require careful attention as to moisture and temperature for best results. They must not receive too much water, especially while the seed are germinating, and the temperature must not be allowed to fall too low.

When set in the field the plants are put in rows 3 feet apart and 18 to 24 inches apart in the row. They are given about the same cultivation as potatoes or tomatoes during the growing period.

KOHL-RABI

Kohl-Rabi is a vegetable with which the average American is not very familiar. It will grow well under the same conditions necessary for the production of good radishes and deserves to be cultivated more than it is.

Kohl-rabi is closely related to the turnip and produces a thickened stem or bulb above the surface of the ground. It has excellent quality and is sometimes called the "Lazy Man's Cauliflower," being cooked and served in a manner similar to cauliflower.

The plant is hardy and can be grown in sections where the cauliflower cannot. The seed should be planted as early in the spring as possible in rows 18 inches apart. The plants should later be thinned to stand 6 to 8 inches apart in the row. Successive plantings at intervals of two weeks will insure a supply for a longer period. The vegetable should be gathered as soon as ready, which is about the time the swollen stems are $1\frac{1}{2}$ to 2 inches in diameter. It remains in prime condition only a short time, soon becoming tough and woody, so, for best results, must be used when just right.

LETTUCE

Lettuce is the most important salad plant under cultivation and can be grown under a variety of conditions. The two types of lettuce most commonly grown are head lettuce and leaf lettuce.

Head Lettuce.—This crop has recently assumed considerable importance in Colorado. In certain localities it has been found to grow exceptionally well and to return to the grower profits which seem very attractive. Some localities where it has been grown successfully are the following: the vicinity around Buena Vista, the Wet Mountain Valley which lies southwest of Canon City, the San Luis Valley, and at Tabernash, in Grand County. These localities have an elevation of from 7,000 to 9,000 feet and climatic conditions which make possible the production of large, hard heads of lettuce of the finest quality.

The lettuce plant is quite hardy and seed may be planted in the spring before danger of frost is entirely over. The crop should be grown on good land and the rows may be planted two to two and one-half feet apart. The seed should be sown thinly, and when the plants have developed about four leaves they should be thinned to stand 10 or 12 inches (some recommend 16 inches) apart in the row. Leaf lettuce can be grown with the plants close together in the row, but to produce good heads, the plants must have plenty of room.

Head lettuce should be given frequent, shallow cultivation and should be irrigated whenever necessary. The quality of the crop depends to a large degree upon the moisture conditions and the plants should never be allowed to become checked in growth for want of water. Any such checking is apt to cause many plants to go to seed or produce unmarketable heads. In practice there are usually a considerable number of such plants anyway, in spite of all the grower can do.

With increase of production of head lettuce in the state, the marketing of the crop is presenting some difficulties. Lettuce is a perishable product and must be handled rapidly and under refrigeration, and even then sometimes fails to reach its destination in good condition. The consumer usually pays a good price for head lettuce, which gives one the impression that it must be a very profitable crop, but the cost of marketing, including transportation, refrigeration, commissions, etc., is high, so that the grower receives only a small percentage of the price paid by the consumer.

The indications are that there will be a much larger acreage of head lettuce planted in the future than in the past. This means greater production and, until marketing facilities have been improved, probably means lower prices. The prospective grower should bear this in mind and not be too much influenced by what he has heard in the past regarding enormous returns from this crop. While it has been a very profitable crop in some instances, there are several drawbacks which should be taken into consideration. One man cannot handle more than three to five acres, and at times he will need considerable help with that. Diseases, hail, delay in transportation, difficulty in securing proper kind of labor, all make the risks connected with the crop considerable, and to avoid disappointment the grower should go into the business with his eyes open.

Varieties of Head Lettuce.—The variety of head lettuce which is being grown successfully for market is the New York or Wonderful, known also as Los Angeles Market. It pays the grower to secure the best seed of this variety possible as the tendency to run to seed or produce otherwise undesirable heads may be due in a large measure to poor seed. Burpee's Way-ahead is one of the surest heading varieties known, and is well adapted for home use, especially at lower elevations. It will produce rather small but compact heads when other varieties refuse to head at all. Other varieties are May King, Big Boston, Deacon, and Tennis Ball.

Leaf Lettuce.—This type of lettuce, also called "Cutting Lettuce," is frequently grown in home gardens, and while it may thrive under neglect, it will be of better quality if grown on rich soil, well cultivated and properly irrigated. When grown in the garden it is usually not thinned but the leaves are cut off and used when of sufficient size. Otherwise its culture is the same as for head lettuce.

Varieties of Leaf Lettuce.—The most commonly grown variety of leaf lettuce is Grand Rapids; Black Seeded Simpson is another well-known variety.

Lettuce in Hotbeds.—This is one crop which, due to the short time required for its growth, may be successfully raised in hotbeds or cold frames. By growing it in this way, either leaf or head lettuce may be had for the table much earlier than if planted out of doors.

The plants should be started in a shallow box or "flat" early in March and transplanted into the hotbed 6 or 7 inches apart each way when they have developed the second pair of leaves. For cold frame culture it will be necessary to delay planting of the seed until the latter part of April.

MUSKMELON

Under the term "muskmelon" is included a number of types of melons. The most common of these are the ordinary muskmelon, characterized by a large seed cavity, distinct ribs, and a surface more or less free from netting, and the cantaloupe, an ideal specimen of which has a small seed cavity and a heavily netted surface, showing no ribs at all. Much effort has been expended toward perfecting the latter type in the Rocky Ford section and the type of melon grown there is well known throughout the country.

The muskmelon is naturally a tropical plant and requires a long, warm season for its best development. For this reason, we cannot expect to produce as profitable a crop in the northern part of the state as at Rocky Ford, but some should be grown for home use. A warm, sandy loam is the best soil for growing cantaloupes. Such land on which alfalfa has grown for two or three years is probably the ideal in this climate. The soil should be in the best of tilth and should be well, but not too heavily, fertilized with stable manure.

Rows are laid off 5 or 6 feet apart each way and 8 to 10 seeds planted at each intersection. The seed are covered to a depth of about 1 inch. When well up the plants should be thinned out, leaving two in each hill.

Thorough and frequent cultivation should be given. During the early stages of the crop, the ground should be stirred rather deeply and close to the plants, but as the vines spread cultivation should be more shallow and further away. Light, frequent irrigations have proven to be of more advantage than heavy soakings given at considerable intervals.

Muskmelons are said to have three stages in three days—green, ripe and rotten. While this is exaggerating the actual facts to some extent the time when the melons are in the best of condition for picking is very short. If harvested too early or too late, the quality will not be up to the standard. It is hard to describe just the proper stage at which the melons should be picked. There is a slight change of color in the interstices of the netting which can be recognized by an experienced picker, and the melon "slips" from the vine, that is, the stem does not break off when the melon is pulled, but separates easily from it.

Varieties.—Early Watters and Rust-Resistant Pollock (both Rocky Ford varieties), Emerald Gem, Osage, Extra Early Hackensack, and Honey Dew.

ONIONS

The growing of onions is an important industry in several sections of the State. They can be grown in practically all parts of the State for home use and for local markets, and in some districts they may be grown with profit for distant markets.

Onions may be grown from seeds or sets. The latter are more often used in growing early green onions, while mature onions are usually grown from seed. In the latter case, either of two methods may be employed. By

the first method, the seed is planted in early April in single rows 14 to 18 inches apart, or a system of double rows may be used. In this case furrows are laid out about 26 inches apart, and a row of onions is planted on each side of every furrow. This leaves the rows of each pair about 12 inches apart with 14 inches between the pairs of rows. The onions are irrigated throughout the season by running water in the furrows between the rows of each pair.

With seed of known germinating power and conditions necessary for germination under control, it is not necessary to plant much more seed than is necessary to give a good stand, so that thinning is unnecessary, but where the seed is sown rather thickly the plants should be thinned when they are 4 or 5 inches high to stand about 3 inches apart in the row.

Seed should be covered only about one-half to three-fourths of an inch in depth. When planted for market, the size of the patch usually justifies the use of a small seed drill as this enables the work to be done accurately and uniformly, but in the home garden planting can, as a rule, be done more economically by hand.

The other method, which has many advantages and which should be employed more extensively, is what is known as the "New onion culture." The seed is sown in the hotbed about March 1st in drills 5 or 6 inches apart. When ready to put the plants outside (the small bulbs should be about the size of a lead pencil), they are taken up, the roots cut back to one-half inch in length, and part of the top removed, after which they are transplanted in the usual way, being set 3 to 5 inches apart in the row. By this method, the grower is able to lengthen the growing period by starting his onions early, and is thus enabled to grow to perfection the milder flavored onions, such as the Spanish and Bermuda types, which require a longer season than we normally have here. He also eliminates the tedious process of thinning and weeding and is sure of a perfect stand of good plants properly spaced. The ground can be cultivated before the onions are transplanted to it, and the first crop of weeds killed. In addition, onions of this kind give larger yields and sell for higher prices than common onions.

To offset these advantages are the disadvantages of transplanting and of supplying hotbed space. However, transplanting an acre of onions requires but little more labor than thinning the crop which has been planted the old way. About 150,000 plants per acre are required. One man can set 8,000 to 10,000 plants per day. The cost of hotbed sash is the most important item. It requires twenty 3x6 sash to grow enough plants to set an acre.

Frequent shallow cultivation should be given. The hand wheel hoe is best for this. Care must be exercised in irrigating. The tendency is to give too much water, causing a large per cent of scullions. In the early part of the season, water should be given sparingly to promote strong root development. An irrigation every ten days is all that is necessary during the growing period. No water should be applied after August 15th, but withheld in order to allow the crop to mature.

Breaking the tops of the onions down by rolling a light roller of some kind over them may sometimes be advisable when the crop is tardy about maturing. However, if the plants can be induced to mature naturally, a much more satisfactory product will result.

When ready to harvest, the roots should first be cut by running a U-shaped blade under the bulbs. Such a blade may be attached to a double-wheeled hand hoe, or a longer blade, cutting two rows at a time, can be drawn by a horse. The tops are then cut off about half an inch above the bulb, and the onions are raked into windrows, preferably with wooden rakes, and allowed to dry for six or eight days. They are then put in sacks and sold, or they may be placed in storage. See latter part of this bulletin for storage directions.

Varieties.—Yellow Globe Danvers, Red Wethersfield, Southport Yellow Globe, Southport Red Globe, Silver Skin. For growing by the transplanting method: Prizetaker, Gigantic Gibraltar, Red and White Bermuda, and Denia.

POTATOES

Potatoes are rapidly becoming an important garden crop, not only on the farm, but also in the city and town gardens, and more space should be devoted to them. They yield more food for a given space than almost any other vegetable grown, and have the additional advantage of long keeping qualities.

Soil.—In general, the best soil for potatoes is a deep, sandy loam, underlain by a porous sub-soil. The character of the sub-soil is important. Even the heavier soils are often productive when the sub-soil is gravelly or open. Heavy soils which easily become puddled are not suitable for potatoes unless large quantities of well-rotted manure are applied, and the soil is plowed deeply or spaded in the fall.

Preparation of Soil.—The preparation of the soil for potatoes should be thorough and deep, in order that the plant may have a large feeding area. Potatoes should never be grown more than once in succession on the same soil, and this is difficult to avoid on small areas. On the farms where a regular system of crop rotation is practiced, this difficulty is easily overcome. In garden practice, where farm rotation is not possible, rotation of vegetables from one piece of the garden to another is advisable. In order to supply the one piece of the garden to another is advisable. In order to supply the needed vegetable matter and fertility, the land should be given a heavy top dressing of stable manure. The older and more decomposed this manure, the better it is. On heavy soil, the manure should be applied in the fall and plowed or spaded into the land. The plowing or spading for potatoes should be 10 to 12 inches deep, to permit the root system to penetrate as deeply as possible. The land should be cross-plowed or spaded again in the spring a few days before planting. On lighter soil, the manure and the plowing may be deferred until spring, but the application of the manure

and the plowing should be done sometime before planting. The land should not be plowed or worked while wet.

Planting.—For garden purposes, the planting may be done by hand. A line is stretched across the lot, and a furrow or trench is opened along it to the depth of 4 to 4½ inches, depending upon the character of the soil. On heavy land, the potatoes should not be planted more than 4 inches deep, while on lighter land they may be planted as much as 5 inches deep. The seed should be placed 12 to 14 inches apart in the trench, and the trenches may be from 30 to 36 inches apart, depending upon the available space, 36 inches being about right for irrigation. The trenches are then filled up, and the ground left level.

Seed.—For garden purposes, early varieties are most satisfactory; varieties like the Rose Seedling, Early Ohio, Triumph, and the Cobbler. Whenever possible, whole seed should be planted. The size should vary from one to three or four ounces in weight. When cut seed is used, each piece should have not less than one eye, and not more than two, and each piece should weigh from an ounce and a half to two or even three ounces.

Cultivation.—Cultivation should begin soon after the crop is planted and before the plants are up, the object being to keep the soil aerated, to conserve the moisture, and to kill the weeds. After the plants are up, cultivation should be continued between the rows. If the ground has a tendency to bake, the first few cultivations after the potatoes are up should be rather deep, to loosen up the soil below.

Irrigation.—Potatoes should never be irrigated by sprinkling. Furrows should be made between the rows to the depth of 6 or 8 inches, and the water led into these furrows slowly, and long enough to wet through the rows between the furrows. It is better to apply small quantities of water and keep it on for a longer period, than a large amount for a short period. As soon as the land is dry enough to permit handling, the surface of the soil should be cultivated to break the crust and prevent evaporation. When the vines cover the rows, the water may be applied in every other furrow. While the soil should be kept moist during the growing season, too much water is harmful.

In dry seasons it will be necessary to apply water to get the plants up. When this is the case, the water should be run in a furrow a few inches from the row and allowed to soak through to the soil around the seed. After that it will probably not be necessary to irrigate again until the potatoes commence to form. As soon as the surface soil is dry enough, after each irrigation, it should be cultivated in order to check evaporation.

The gardener may begin using the potatoes as soon as they have matured sufficiently and all of them should be dug before there is any hard freezing weather. Methods of storing potatoes are given in the latter part of this bulletin. A separate bulletin dealing with "Potato Culture in Colorado" may be obtained by addressing the Experiment Station.

PARSNIPS

The soil for parsnips should be rich and deeply prepared. Before planting, the surface should be thoroughly fined, as the seed are rather slow to germinate, and the young seedlings very delicate. The seed are planted as early in the season as possible, in rows 18 to 24 inches apart. Plant about ten seeds to the foot and cover not more than 1 inch deep. The plants should be thinned to stand 3 or 4 inches apart in the row when well up.

The roots will be ready for use by September, but they have not the quality then that they have later in the season. Parsnips are considered to have a better flavor if subjected to frost and they may be allowed to remain in the ground over winter.

Varieties.—Guernsey and Hollow Crown (the latter is considered best).

PEAS

The growing of peas is of considerable importance in Colorado. They are adapted to most all sections of the State and are grown extensively for canning in the northern portion.

There are three types of peas under cultivation: (1) The smooth, round-seeded kinds; (2) the wrinkled-seeded kinds; and (3) those with edible pods. Only the first two are of importance. The different kinds are further divided into tall, medium, and dwarf-growing varieties. Generally speaking, the dwarf, round-seeded varieties are the earliest and most hardy. On the other hand, the tall-growing, wrinkled-seeded varieties are of better quality and have a longer fruiting period.

For the home garden, peas are often planted in double rows 6 inches apart with 2 to 2½ feet between the double rows, but the most common method is to plant them in single rows about 2 feet apart. The seed for the first crop should be planted as early in the season as the ground can be gotten in shape. It has been found that the vines will produce better and for a longer period if the seed are planted 4 to 5 inches deep. However, for the early plantings, it is advisable not to plant more than 2 or 3 inches deep as the ground is cold and wet early in the spring, and may cause the seed to rot before they will germinate. Successive plantings should be made in order to have them in edible condition for a longer period. The tall-growing kinds require a trellis of some kind to support them and this may be supplied by using brush stuck between the rows, or chicken wire may be used. The vines must not be allowed to suffer for water.

Varieties.—Smooth-Seeded: Alaska, Extra Early. Wrinkled peas: Gradus, Thomas Laxton, Nott's Excelsior, Stratagem, Telephone.

PEPPER

Pepper requires about the same conditions as the tomato. The seed are slow to germinate and should be started in the green-house or hotbed in March in order to have good-sized plants for setting out when danger of frost is past. The young plants should be transplanted once before they are

finally moved into the field. The distances for setting the plants outside are 15 to 18 inches apart in rows which are 2 to 2½ feet apart. The subsequent cultivation of the crop consists in keeping down weeds and stirring the soil from time to time.

Bull Nose, Ruby King and Neapolitan are three popular varieties.

PUMPKINS

Pumpkins are very often grown as a companion crop with corn in the Northern and New England States. They are also grown as a separate crop, being handled the same as winter squashes. The seed are planted in hills 8 feet apart each way, five to ten seeds in a hill when there is no longer any danger from frost. The pumpkins should be harvested with a portion of the stem adhering before frost kills the vines in the fall. They can be kept for three or four months in warm, dry storage.

Two varieties are Small Sugar and Big Tom (Large Field).

RADISHES

The radish is one of the most popular spring vegetables on account of its hardiness, quick return and agreeable crispness and flavor.

For early radishes, the seed should be planted in rows 15 to 18 inches apart. About 30 or 40 seeds are planted to a foot of drill. It is best to sow the seed in a band 3 or 4 inches wide instead of placing them in the bottom of a narrow furrow. The seed should be covered three-fourths of an inch deep and the soil compacted over them. It has been found that it pays to use only the largest seed. A much better and earlier crop results when large-sized seed are planted than when smaller ones are used.

In addition to being planted in the above manner, radishes are very often grown as a companion crop with lettuce or as a catch crop between cabbage, beans, and potatoes. Radishes require only a short time for maturity, and when planted between the rows of these crops they reach maturity and are out of the way before the ground is needed by the other crop. In harvesting radishes, if the larger specimens are pulled and used first, more room is thereby given those which remain.

This vegetable is often forced in hotbeds or cold frames. Seed is usually planted in the hotbed or cold frame very early in the spring in rows about 6 inches apart with 30 or 40 seed to the foot. Grown in this manner, the crop will reach maturity in three to five weeks. Radishes are comparatively hardy plants and naturally grow in the cool parts of the year. Therefore, when grown in hotbeds, low temperatures should be the rule. A temperature of 60° to 65° Fahrenheit during the day and 45° to 55° Fahrenheit at night is about right.

Winter Radishes.—The winter varieties are comparatively little grown in this country. The seed may be planted in July or early September and cultivated until the approach of severe weather. Then they are taken up and placed in sandy soil in the cellar or put in pits in the field the same as turnips. In this way, they will keep in as good condition as turnips.

Varieties.—Varieties of radishes are numerous and the taste of the gardener as to color and shape should determine the kinds grown. Scarlet Button, Scarlet Globe, Scarlet Turnip White Tip, Long Scarlet Short Top, French Breakfast, White Olive Shaped, and White Icicle are all good. Celestial and Black Spanish are well-known winter varieties.

RHUBARB

Rhubarb, or pie plant, is found in almost every garden. It is grown for its thick leaf stalks which are used in making pies and sauce. The stalks are also cut in cubes and canned for use as occasion requires.

Plants for setting out may be obtained by one of three methods: (1) They may be secured from seedsmen and set out at once in their permanent location; (2) seed may be planted early in the spring in rich soil at a depth of 1 inch, and when the plants are well up, thinned to about 1 foot apart in the row. This method will give a large number of plants which are not true to type and which must be discarded. After one season's growth the desirable plants are ready to put out in the permanent plantation; (3) The most common method of securing plants is to divide into several parts large roots from old plantations. In this way the gardener is assured plants which are true to the original type. The division of the old crowns should be made in the early spring and the resulting plants set out at once in their permanent places.

When ready to plant, rows are laid out 4 or 5 feet apart and the plants are set rather deeply, 2 or 3 feet apart in the row. The crowns of the plants are covered 2 or 3 inches deep with soil. The plants should be set deep enough so after covering there is a slight depression over the crowns. The roots are set out early in the spring.

The crop should be carefully cultivated and liberally fertilized until it reaches bearing age. This is one or two years after the plants are set. It is better to wait until the plantation is two years old, as the roots will be stronger and better able to withstand the removal of the leaves.

After the plants reach bearing size, cultivation is usually delayed until after the harvest period in the spring. Then a heavy dressing of stable manure should be put on and cultivation given throughout the remainder of the growing period. Seed stalks should not be allowed to mature, as they are a heavy drain on the vitality of the plants.

Varieties.—Victoria and Linnaeus.

SPINACH

This is a plant grown in the early spring and late fall for "greens." While grown extensively in some sections its cultivation in the home garden should be more general. It is superior to any other salad plant grown for boiling.

Being a hardy vegetable, it is planted very early in the spring for the early crop. The seed may be sown thickly in rows 12 to 18 inches apart and the plants thinned out when well up.



White Bush, or Scalloped Squash—an early, prolific summer variety

For fall use, the seed are sown in July or August, and the crop is ready to harvest before severe weather sets in.

Varieties.—Long Season and Victoria.

SQUASH

There are two general types of squashes, known as summer and winter squashes. The former includes the summer crook-neck, the scallop squash, and the cymling of the south, while the latter includes the "late-keeping" varieties like the Hubbard. The summer squashes require a much shorter period for maturing and are better adapted to localities where the growing season is short.

Squashes are planted about the same time as corn. Rows are laid off 4 to 8 feet apart, depending on variety, and six to ten seeds planted in each hill, the hills being placed from 4 to 8 feet apart in the rows. The seed are covered about 1 inch deep and when the plants are well up and danger from insects is past they are thinned to two or three plants in a hill. Subsequent cultivation consists in keeping down weeds with an occasional stirring of the soil.

For early planting, the seed may be sown in berry boxes in the hotbed, as suggested for cucumbers, and transplanted to the open after danger of frost is past.

The summer squashes are edible only before the shell begins to harden. As long as it is possible to cut through the skin with a slight pressure of the thumbnail, the squash is in edible condition, but after it becomes more resistant, it is not fit to be put on the market or table.

With the late-keeping kinds, however, the harder and more resistant the shell, the better. This type is not used until mature, and their hard

shells enable them to be kept for some time in storage. In harvesting them, a small portion of the stem should be left attached to the squash and care observed not to bruise the fruits. They should be left in the field as long as possible in the fall, but must not be subjected to freezing weather. They will keep fairly well in dry, comparatively dark cellars where the temperature ranges from 45° to 60° F.

Varieties.—White Bush Scallop, Golden Summer Crookneck, Hubbard, Essex Hybrid, Delicious, Banana.

SWEET POTATOES

Sweet potatoes, while not adapted to all parts of Colorado, can be successfully grown at the lower altitudes in the southern and eastern parts of the State.

Sweet potatoes are propagated by means of sets, which are grown in large numbers from the smaller-sized potatoes placed in a hotbed a few weeks before planting time. A manure hotbed should be prepared in the usual way and the manure covered with about 3 inches of sandy soil. The potatoes are placed on this just far enough apart not to touch and covered with three inches of good sandy soil. This hotbed should be made about April 1st to 15th and the plants set in the field as soon as danger of frost is past.

The slips are ready to pull when about 6 inches high, and, after the first crop of sets is removed, a second crop will come up to take its place. They are removed by holding down the mother root with one hand and pulling the sets off with the other.

The plants are set about 15 inches apart in rows $3\frac{1}{2}$ or 4 feet apart.

Thorough cultivation to prevent weed growth should be given until the vines begin to run, after which horse-drawn implements cannot be used.

Harvesting and Storing.—The crop is harvested at about the same time as Irish potatoes, and in much the same manner. Sometimes a turning plow equipped with two rolling colters which cut the vines on either side of the row is used. The potatoes are handled as carefully as possible to avoid bruising.

According to a bulletin issued by the Georgia Experiment Station, sweet potatoes can be kept over winter by the following method: As soon as the tubers are harvested, they are brought into the storage house and put in bins. The temperature is then raised to 90° or 100° F. and held there for seven to ten days, in order to dry out the excess moisture. The temperature is then gradually lowered to 50° or 60° and maintained at that point. This is the only satisfactory method, so far developed, by which sweet potatoes can be successfully kept during the winter.

TOMATO

The tomato, being a tropical plant, requires a long growing period, and any method by which the growing period can be lengthened in this climate will prove an advantage. This can best be accomplished at the beginning

rather than at the end of the season. Seed may be sown in flats and placed in the hotbed from March 1 to 15. As soon as the plants are large enough to handle, they should be transplanted so as to give them more room. They may be transplanted either into other flats, into 4 or 6 inch pot, or directly into the soil of the hotbed (if the weather permits they may be put into a cold frame). In many cases one transplanting will be all that the gardener has time to give, but if somewhat better plants are wanted, two transplantings should be given. If this is done a distance of 2 inches between plants each way will be sufficient at the first transplanting and about 4 inches the second time. The latter transplanting is made when the plants begin to crowd each other. About two weeks before their removal to the field, the plants should be hardened off by exposing them as much as possible to outdoor conditions, avoiding at the same time any exposure which will cause damage. Leaving the sash off the hot bed on bright, warm days and on mild nights will usually accomplish the desired result. Setting in the field is done from May 15 to June 1, depending on locality and season.

The plants should be set about 4 feet apart each way in the field. Care should be observed to check their growth as little as possible. Leave as much soil as possible adhering to the roots when the plants are being moved.

The plants are trained sometimes to stakes 4 or 5 feet high. In this case, they are usually grown with a single stem (prevented from branching) and the plants tied to the stake. This method should give somewhat earlier ripening crops, as the fruits are better exposed to the sunlight than where the vines are allowed to sprawl over the ground, but the yield will not be as great.

Varieties.—Earliana, Early Jewel, John Baer, Prosperity, I. X. L., Bonny Best, Stone, Beauty.

TURNIP

The turnip is grown either for early spring use or for use in the late fall and winter. The term "turnip" includes both the common turnip and the rutabaga. The former is grown as an early spring crop to be followed by some other crop, or it may be grown after an early crop, such as peas or beans, while the rutabaga requires the soil for a longer period, the seed being sown in May and the crop harvested in the fall.

The seed for the early crop is sown in March or April in rows 15 to 18 inches apart, and covered to a depth of three-fourths of an inch. When the plants are well up, they are thinned to stand 4 to 6 inches apart in the row.

For the late crop, the seed is sown in July or August following the harvesting of some other crop. They may be planted broadcast or in rows. When mature, the crop is harvested and the tops cut off. The turnips may then be stored in pits or cellars much as potatoes.

Rutabagas are treated in the same manner as the late crop except they must be planted in May instead of July or August.

Varieties.—Turnips: Purple Top Milan, Red Top White Globe,

White Egg. Rutabagas: Large White, Burpee's Breadstone, Golden Neckless.

WATERMELONS

Watermelons are much less widely cultivated in Colorado than the muskmelon, but with proper care they can be grown in many parts of the State.

The watermelon is a tender plant, so that planting must be delayed until danger from frost is past. The seed should be planted in hills about 8 feet apart each way and covered 1 inch deep. It is best to use a dozen or more seed to each hill in order to be sure of having a perfect stand. After the plants have become well established they should be thinned, leaving two or three to a hill.

In the northern part of the State a better plan to follow is to sow seed in pots, strawberry boxes, or on pieces of sod placed in the hotbed. By this method, the seed may be planted in March or April, and the plants removed to the field after cold weather is over. The plants can be moved without checking them at all, and the advantage gained by lengthening the growing period is considerable. Moreover, when in the greenhouse or hotbed, the growing plants can be much more easily protected at the most critical stage from insects and other troubles than if they were scattered over a field.

The best culture possible should be given the crop early in the season so that a small amount will be required later when the vines begin to cover the ground.

Varieties.—Cole's Early, Kleckley Sweets, Tom Watson, Phinney's Early.

HARVESTING VEGETABLES

The quality of many vegetables depends upon the time and stage at which they are harvested, therefore a few points in this connection are given below.

Many vegetables are best harvested in the early morning, as they are then full of water and crisp. This is especially true of vegetables used in a green state, as lettuce and radishes.

Peas and sweet corn are of much better quality when gathered only two or three hours before being prepared for the table. They deteriorate rapidly after being removed from the plant.

The quality of radishes, carrots, beets, and kohlrabi depends usually upon their size, the smaller the vegetable the better the quality. When allowed to grow too large, kohlrabi and beets become somewhat woody. They should be used when about 2 to 3 inches in diameter.

Leaf lettuce should be used as soon as the leaves are large enough, but head lettuce should be left alone until good, firm heads are formed.

Cauliflower should be harvested as soon as the heads reach good size and before they begin to deteriorate.

Cabbage and celery will stand some frost in the fall, but should be

harvested before severe weather sets in. Late celery may be banked up where it stands in the field and left for a time, even after cold weather comes.

Potatoes must be dug before there is any danger of the tubers freezing. Where the tubers grow close to the surface, they are sometimes hilled up slightly to prevent injury from light freezes. Immature potatoes will not keep well, so they should be left in the ground as late as is safe in order to allow them to ripen as well as possible.

Parsnips may be left in the ground all winter if desired, but, owing to the difficulty of getting them out of the frozen ground, some should be dug in the fall and stored for use during the winter.

STORING VEGETABLES FOR HOME USE

It is to the interest of every family to grow each season a supply of those vegetables suitable for storage, and to see that they are properly stored for use during the winter months when prices are high and vegetables often hard to get.

Less work and less expense are involved in storing vegetables than in keeping them by other methods, as canning, drying, and preserving, and the product retains its characteristic flavor much better.

Planting for Storage.—When it is the plan to store a certain part of the crop, some of the kinds should be planted with this in mind. Beets and carrots, for instance, when planted for early use, become too tough and woody before fall to be desirable for storage purposes. They should be planted somewhat later in order to be of good quality for winter use.

ROOT CROPS

Potatoes, beets, carrots, parsnips, winter radishes, turnips, rutabagas, salsify, kohlrabi.

Small Quantities.—Store in boxes (or heaps) of slightly moist (not wet) sand or sandy soil in a cool cellar. Put in alternate layers of sand and vegetables. Vegetables stored in this way will not shrivel. Tops of vegetables should be removed, of course, before storing. Do not cut beet tops too close.

Large Quantities.—Store in root cellar in bulk, or in outdoor pits, as follows: Make excavation 6 or 8 inches deep, 4 feet wide, and as long as necessary. Cover ground with layer of straw, and place vegetables in conical heap of any desired length. Cover with 12 to 18 inches of straw. On the layer of straw, as the weather gets colder, place a layer of soil 4 to 6 inches in depth. If some straw is left protruding at the top of the pile at first, it will provide for the passing off of any heat which may be generated when the vegetables are first covered.

This protection will suffice except in the most severe weather, when an additional layer of straw or strawy manure may be put on.

In removing the vegetables from the pit after the layer of soil is frozen, a small hole may be chopped in one side and the vegetables needed taken out.

CABBAGE

Small Quantities.—When it is desired to store a small quantity for two or three months, the stems and outer leaves may be removed, and the heads stored in a cool cellar. Only firm, solid heads should be selected for storage. Keep the temperature low to prevent premature growth.

Pit Storage.—A common method for outdoor storage is to dig a trench 6 or 8 inches deep, wide enough to accommodate three heads, and as long as necessary. The plants are pulled up roots and all and placed heads down in the trench, leaving the outer leaves and stems intact. On top of the three rows of heads, put in the trench in this way, are placed two more rows, between the stems of the first. A layer of straw is put next to the cabbage, and on top of this a layer of soil, which is increased as the weather gets colder. It is not necessary to cover sufficiently to prevent freezing, as some freezing does not injure cabbage stored in this way.

CELERY

Cellar Storage.—Dig plants as late as possible (avoid injury from severe freezing) with some soil adhering to roots, and partially replant the plants in an upright position, placing them closely together, in a cool cellar. The soil or sand in which the roots are replanted should be kept moist by watering. In watering, do not wet the tops of the plants. Keep cellar well ventilated, and the temperature just above freezing, if possible.

Trench Storage.—Dig a trench in the field about 1 foot wide, deep enough so that tops of plants come to the surface of the ground, and as long as necessary. Set the plants, which should be dug with good portion of root system left on, as closely together as possible in this trench, and water the soil around the roots, being careful not to wet the tops. Nail two planks together to form a trough, and invert this over the trench. Until severe weather, ventilate by putting blocks under trough during warm weather. As the weather gets colder, put on straw, strawy manure, or soil in sufficient quantity to prevent plants from freezing. When a portion of the celery is removed it is best to do it when the outside temperature is above the freezing point.

ONIONS

Common Method.—Keep in cool cellar (temperature just above freezing point) where it is dry and where there is good ventilation. Store in slat crates or shallow trays, not in bulk.

Another Method.—Onions may be stored in a dry, cold place, such as a barn loft, where they are allowed to freeze and remain frozen until ready to use. After freezing, cover them with a layer of straw, so they will not freeze and thaw alternately. When ready to use them, place the onions where they will thaw out very slowly (as in a cool cellar). Handle carefully and as little as possible while frozen.

VEGETABLES REQUIRING WARM STORAGE

Pumpkins, sweet potatoes, squashes.

These vegetables require dry, comparatively warm storage. The temperature should be around 45° to 50° F., which is considerably warmer than for other vegetables. The cooler parts of a furnace room are often satisfactory for these vegetables.

When harvesting squash and pumpkins, leave the stems on, as decay at the stem end is then less likely to occur.

LIST OF SOME OF THE BULLETINS AND BOOKS OF INTEREST TO GARDENERS

COLORADO EXPERIMENT STATION, FORT COLLINS, COLO.

- No. 201—Some Colorado Mushrooms.
- No. 221—Hotbeds and Cold Frames.
- No. 226—Beans in Colorado and Their Diseases.
- No. 243—Potato Culture in Colorado.
- No. 256—Horticulture at High Altitudes.
- No. 259—Colorado Plant Diseases.
- No. 271—The Mexican Bean Beetle.

COLORADO EXTENSION SERVICE, FORT COLLINS, COLO.

- No. 163-A—Marketing Colorado Cabbage.
- No. 177-A—Certified Seed Potatoes.

DIVISION OF PUBLICATIONS, U. S. DEPARTMENT OF
AGRICULTURE, WASHINGTON, D. C.

- Farmers' Bulletin 204—The Cultivation of Mushrooms.
- Farmers' Bulletin 220—Tomatoes.
- Farmers' Bulletin 254—Cucumbers.
- Farmers' Bulletin 282—Celery.
- Farmers' Bulletin 289—Beans.
- Farmers' Bulletin 345—Onion Culture.
- Farmers' Bulletin 433—Cabbage.
- Farmers' Bulletin 434—The Home Production of Onion Seed and Sets.
- Farmers' Bulletin 818—The Small Vegetable Garden.
- Farmers' Bulletin 829—Asparagus.
- Farmers' Bulletin 856—Control of Diseases and Insect Enemies of the Home Vegetable Garden.
- Farmers' Bulletin 879—Home Storage of Vegetables.
- Farmers' Bulletin 884—Saving Vegetable Seeds for the Home and Market Garden.
- Farmers' Bulletin 936—The City and Suburban Vegetable Garden.
- Farmers' Bulletin 937—The Farm Garden in the North.
- Farmers' Bulletin 999—Sweet Potato Growing.