PRACTICAL SCHOOL and HOME GARDENS

George W. Hood

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BY

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PREFACE

"Practical School and Home Gardens" is written especially for elementary school and home garden work. It can be used for school work between the sixth and the twelfth grades, and is thought suitable for anyone who wishes to make a home garden. It tells how to do things in the most practical way, and should be a great help to all students, interested in garden making. It is hoped the instructor can give sufficient time in the school room to finish the book before out-of-door work begins. This will amply prepare the student for the different garden operations necessary in the making of a school or a home garden.

It is a modest attempt to fill a place that, for a long time, has seemed to be vacant. The aim is to give the student the fundamental knowledge necessary to successfully grow a garden.

It is the object of this book to give explicit directions for every detail of the work in garden making. It is written in simple language, so that any person can easily follow the instructions.

The references given at the end of each chapter are valuable for those who wish to know more about the subject. A list of the agricultural experimental stations will be found in the appendix, and every individual can secure the agricultural bulletins from his respective state, free of charge, by writing to the director. These offer a valuable addition to a library.

The author wishes to express his appreciation to Dr. F. A. McCormick for Fig. No. 4; to Professor Lawrence Bruner for Figs. No. 38, 39, and 42; and to Mr. L. F. McShane for Figs. No. 51 and 67—all of the University of Nebraska. The author is also indebted to Professor Wendell Paddock and Professor L. M. Montgomery, of Ohio State University, for valuable suggestions.

George W. Hood

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CHAPTER I.

THE VALUE OF A PLANT.

Plants are of the greatest value to the human race. There are two kinds of plants—beneficial or economic plants, and injurious plants. The economic plants are the plants that give us food, shelter, and clothing. The injurious plants are the plants that do not give us anything of value. All plants that we cultivate in our gardens, fields, and orchards are economic plants. These plants supply us with the necessities of life and such plants should not be harmed. They should be protected and made to grow and to produce a greater yield.

The plants that are grown in great numbers in large fields are called field crops, and include such crops as wheat, corn, and oats. These crops are used for making food for us, as well as for our cows and our horses.

The plants that are grown in our gardens are called vegetables. Vegetable plants furnish us with food.

The plants that are grown in our yards for their pretty flowers are called ornamental plants. These plants please us with their beautiful flowers and delightful perfumes.

The plants that are grown in our orchards are called fruit trees. These trees furnish us with fruit, such as apples, cherries, peaches, pears, plums, oranges, and many others. They furnish us nourishing food which is pleasant and agreeable to eat.

The Parts of a Plant.—When you first look at plants they appear to be entirely different, but every plant is alike

in certain ways. All plants make their own food, which they use in growing larger. Each one has a root, a stem, and many leaves. These parts are used for the same purpose in each plant. Most of our economic plants have flowers. These flowers are used to make seed. The seeds are made so that the plant can reproduce itself, but sometimes we use the seed of plants for food. Plants in our gardens are started by seed which the mother plant has produced.

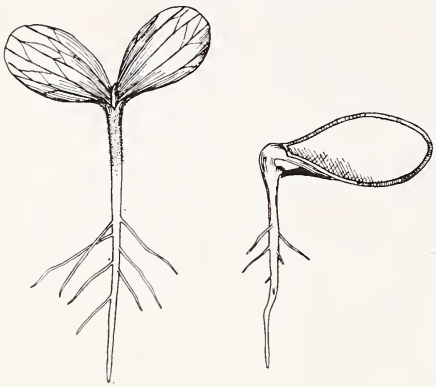


Fig. 1—Squash seedling showing the seed leaves, the growing point, and the root.

The Root.—All of our economic plants have roots. The root usually grows in the ground. Some plants have fibrous roots and some have taproots. A plant with a fibrous root system is one which has a great number of small tiny roots growing out in every direction. A plant which has a taproot is one that has one large root which grows straight down in the soil, and does not have many small roots.

Fig. 2—A plant with a fibrous root

The roots are used for two purposes, namely, to hold the plant in the ground so that the wind will not blow it

over, and to take up water and mineral plant food from the soil so that the plant can grow. The roots of a plant are small and delicate, and we must handle them carefully when we take a plant out of the ground. The plant should always be watered before it is taken out of the soil, so that the earth will stick to the roots and will protect them. The roots should not be exposed to the sun and the wind, and they should never be allowed to dry out. If the roots become dry the plant will usually die.

The roots of some plants are used for food. Several of our important garden plants have thick roots which we use to eat. The food part of the radish, parsnip, carrot, turnip, beet, and salsify are thick, fleshy roots.

Fig. 3—A plant with a fleshy taproot

The Stem.—The stem of a plant is for two purposes, namely, to hold the branches and the leaves in the sun and the light, and to serve as a canal to carry plant food from the roots to the leaves. The stems are either long or short. Some stems are hard and rigid while others are soft. The hard stems are usually found on woody plants such as the trees, while the soft stems are most common on herbaceous plants, such as are found in our gardens. The stems of many plants are used for fuel, building material, and in some cases for food. The thickened stem of the kohl-rabi furnishes us with a good food.

The Leaf.—All plants have leaves. The leaves are very important to the plant, and equally important to us. The leaves of plants are of many different sizes and shapes, but they are all used for the same purpose. Leaves are usually thin, so that they can have a greater surface to expose to the sun. The leaf of a plant is sometimes called a factory, because it takes the mineral food which comes from the soil and makes the plant food which aids the plant to grow and to become larger.

The leaf must have sun and light before it can make plant food. The stem of the plant serves to hold the leaves up into the air and the light, and therefore is very important.

In the leaf we have a green liquid which we call chlorophyll. This chlorophyll, together with the sun, makes starch and sugar which are food for the plant. The water taken up by the roots contains mineral food which is carried up into the leaves. When this mineral food reaches the leaves, where it comes in contact with the chlorophyll, it is changed into other plant food which serves to make the plant grow larger.

The passing off of the water from the leaf surface is known as transpiration. On hot windy days transpiration goes on very rapidly and sometimes so fast that the roots of the plant cannot take up water fast enough, and therefore the plant wilts. The wilting of a plant is injurious and should be avoided whenever it is possible.

The Flower.—The chief function of the flower is to produce seed. The seed is necessary to reproduce the plant. The flower comes as a climax to the growth of almost every plant. The flowers of most plants are either bright colored or possess a pleasing odor, so that insects are attracted to them and seed is more apt to be produced.

The flower is divided into four parts—the pistil, the stamens, the petals, and the sepals.

The pistil is a very important part of the flower. It is always found in the center of each bloom. Some flowers have only one pistil while others have many. The pistil, after it has been fertilized by the pollen, produces the seed.

The stamens of the flower are equally important. These are usually located around the pistil. The stamens vary in number, depending upon the plant, and range from five to fifty and sometimes more. On the top of each stamen is a little

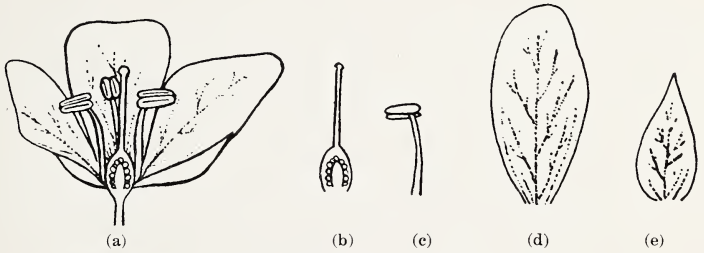


Fig. 4—The parts of a flower
a, cross section showing where the parts are combined for making the seed, shown at the bottom of the pistil; b, pistil; c, stamen; d, petal; e, sepal.

sack called the anther which produces a powdery substance known as the pollen. The pollen must be dusted on the tip of the pistil before seeds can be formed. The transfer of the pollen to the pistil is done by either insects, wind, or some other agent.

The petals surround the pistil and the stamens. They are usually brightly colored and are the showy or the pretty part of the flower. The bright color of the flower is of great value to the plants, because it will attract insects to them, and in this way the pistil will be fertilized. Near the base of the pistil inside of the petals we find a very sweet liquid, called the nectar. The plant uses the nectar also to attract the butterflies and the bees, so that the pollen grains will be carried to the pistil and the seed will be formed. The nectar is used by the bees to make honey.

The sepals are little leaf like structures which surround the petals. They are usually green in color and in many plants form a protection for the seed pod. Occasionally the sepals fall off, after the seed pod forms. They are sometimes similar in shape to the petals, and usually the same number.

The Seed.—After the pistil of the flower has been fertilized

with the pollen from the anthers, the seed begins to develop. When the seed has completed its growth it contains a small living plant which is asleep in the seed. This little plant remains asleep until it is planted. After we plant the seed and give it water, sun, and air, the little plant inside of it wakes up and begins to grow. When the plant starts to grow we say the seed has sprouted, or germinated.

The little plant, after it appears above the ground, is called a seedling, or a plantlet. This little seedling must be handled carefully and protected from insects, so that it will make a big plant like its mother. In order to make the plantlet grow we must give it water. We must also pull out all weeds which are growing near it and hoe and work up the soil around it.

REVIEW QUESTIONS.

1. What two kinds of plants are found growing on the earth?
2. What is meant by field crops, and name two?
3. How do vegetables differ from field crops?
4. Name the three parts of a plant?
5. Describe the root of a plant.
6. For what two purposes is the stem of the plant used?
7. Why must all plants have leaves?
8. What does the leaf do for the plant?
9. What is the chief function of the flower?
10. Name the four parts of a flower.
11. What are the two most important parts of a flower, and why?
12. Why do plants have pretty flowers?
13. Is the nectar in a flower of any importance to it?
14. What is a seed?
15. How is the seed made?
16. What is found inside of a seed?

CHAPTER II.

PLANNING THE GARDEN.

The Value of a Garden Plan.—A garden plan consists of a drawing of the garden on a piece of paper. Such a plan is very important. A well laid out garden plan not only makes the work easier, but helps to conserve strength and energy. A garden plan emphasizes the importance of a crop, and regulates the kind and the number of vegetables before they are planted. By having a plan on paper, it is very easy to figure out the right amount of seed to purchase, and no money is wasted in buying more seed than is needed. The garden plan gives not only the exact location of all the vegetables, but also indicates the date on which they are sown.

The Time to Make the Garden Plan.—The garden plan should be made during the winter or the early spring. Select a time when other work is not pressing, so that due thought may be given to it. In order to have a well laid out garden, some time must be given to arranging the crops. The arrangement is not always easy if the maximum yield of vegetables is to be secured. If plenty of time is given to the planning of the garden, the crops may be so arranged that a constant supply of fresh vegetables will be available for the home. In addition to this the ground will be occupied by successive crops, all thru the growing season.

The garden plan should be made on heavy paper. The plan of the garden on the paper must necessarily be smaller than the original garden. It is necessary, then, to adopt a scale which is small enough, so the plan will fit the paper. A good scale to follow, where the garden is not too large, is to make one-half of an inch on the paper equal one foot on the garden. If the garden is larger, one-fourth or even one-eighth of an inch on the paper can equal one foot on the garden.

The Arrangement of the Crops.—The proper arrangement of the vegetables is important. The old method of making individual beds is not economical, either for production or for labor saving. The crops should be arranged in straight rows across the garden. Where the garden is large, the rows

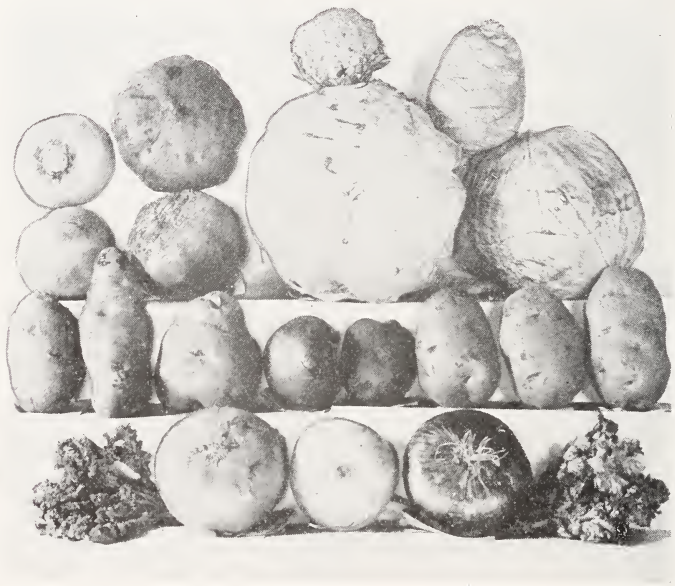


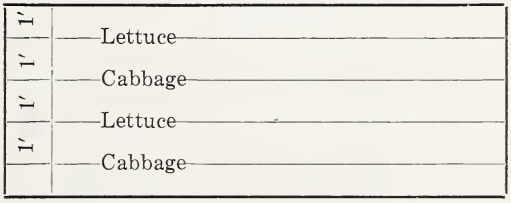
Fig. 5—A collection of vegetables. A garden plan should provide for a number of vegetables

should be spaced far enough apart to permit of horse cultivation. If only a small home garden is planned, the rows can be much closer together, because all of the cultivation can be done with hand hoes.

The garden plan should show the succession and the companion crops. A succession crop is one that follows after another crop, and does not occupy the ground at the same time as the first crop. A companion crop is one that grows with another crop for a part of the time. The first crop is har-

vested and removed as soon as it is mature, and the ground is then given over to the second crop.

The crops should be arranged according to the length of their growing season. All of the early short-seasoned crops, as lettuce, radishes, young onions, peas, and several others, should be grouped together. This arrangement provides for some other short season crop to follow the first, and thereby the ground is occupied the whole season. The long season crops—as, the sweet potato, tomato, eggplant, and pepper, which grow the entire season—should be grouped together. It is hardly ever advisable to mix up the long and the short season crops, altho it is sometimes permissible where



Plan I

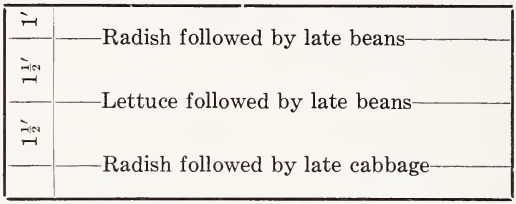
Companion cropping of lettuce and cabbage. The lettuce is removed and the cabbage occupies all the ground.

companion cropping is practiced. Early lettuce is a good companion crop for early cabbage, because the lettuce matures and can be removed before the cabbage needs the room. The pumpkin, squash, and sometimes the cucumber is planted between the rows of early sweet corn, and later the corn is removed.

Pole beans are often planted in the hills of sweet corn and allowed to vine around the cornstalk, which serves as a support for the beans.

Some good succession crops are lettuce, radish, spinach, peas, early beans, and early potatoes. In planning a garden, see that succession crops follow when it is possible. If we grow lettuce, radish, or spinach, which are all short-seasoned crops, it is easy to clear the ground as soon as they have

matured, and to plant other crops, such as late beans, late cabbage, or turnips in the same row, after the first crop has been removed.



Plan II

Succession cropping of lettuce, radish, beans, and cabbage. The succession crop is planted in the same row as the first crop, after it has matured and has been removed.

In arranging the garden, due regard must be given to companion and to succession cropping, because intensive planting is the secret to a good garden plan.

A number of garden plans are suggested in the back of the book, which can be either used as they are or adjusted and modified to meet individual cases.

The value of keeping a record of the garden cannot be overlooked. No matter how small or how large a garden, always keep a record of the amount of produce which is gathered, and from the record calculate the profit or the loss from each crop. By keeping a systematic record, unprofitable crops can be discarded.

REVIEW QUESTIONS.

1. Discuss the value of a garden plan.
2. How should the garden plan be made?
3. What is companion cropping? Succession cropping?
4. When is the best time to plan the garden? Why?
5. How should the vegetables be arranged in the garden?
6. Why is it important to keep a record of the garden?

REFERENCES:

Bulletin No. 171, Purdue University, Agricultural Experiment Station.
Bulletin No. 35, University of Arizona, Agricultural Experiment Station.
Circular No. 154, University of Illinois, Agricultural Experiment Station.
Circular No. 14, Alabama Agricultural Experiment Station.
Farmers' Bulletin No. 255, U. S. Department of Agriculture.

CHAPTER III.

THE SEED AND HOW TO PLANT IT.

The Seed.—The seed for the garden is very important. In the seed is the beginning of the life of a new plant. There is stored in every good seed a little germ, called the embryo. The development of this embryo is determined by natural causes, such as proper treatment before planting it in the soil, and later by giving it water, air, and sunlight. The seed, in order to grow, must be handled carefully and must be given the proper attention. It should not be planted too deeply, yet it must be planted deep enough, so as to give it the proper amount of moisture to grow. The soil must not be lumpy, nor contain stones or rubbish of any kind. It must be fine and smooth.

If the embryo in the seed is alive and strong, and if the seed is sown at the right time and the conditions of the season are favorable, the seed will soon absorb water from the soil and swell. The root will then start to grow and will fix itself in the soil. In a short time the root will begin to take up plant food and the shoot will develop rapidly. In a few days the little plant will appear above the ground. The leaves will unfold, which in turn will make more food for the plant, and the growth will proceed rapidly.

The first leaves that appear on the plant are called seed leaves. These leaves make the food for the little seedling until the true leaves start to grow. About the time the plant appears above the ground, there is developed on the root little hair-like bodies, called root hairs. The root hairs are located just back of the tip of the root, and take up the plant food and water from the soil. The root hairs can be seen if a corn seed is germinated in a dinner plate seed tester.

Selecting the Seed.—Success in the school or the home garden, as well as in farming of any kind, depends upon the choice of the seed. Only seeds of the best quality should

be planted. The seed should be fully ripened, and it must have the power to grow. It should be capable of producing a strong, healthy plant, that will yield a large crop. It makes no difference how well we prepare the soil if the seed is poor—the result will be a failure. The value of the garden depends upon the good things that it yields, and good vegetables can be raised only by planting vigorous, healthy seed of a good variety. Good seed of good varieties are not always cheap, but nothing but the best should be planted. Cheap seeds are always expensive because no results are obtained. Always buy the best seed, because the quantity that is used in a

Fig. 6—Germination of a kidney bean

garden is small, while the returns from the garden are large if seed of the best quality is purchased and good care is given.

The Quantity of Seed to Buy.—The amount of seed that should be purchased will vary greatly. The quantity must be determined entirely by the size of the garden. In the small school or the home garden, often the penny packages of seed will be sufficient. If the garden is larger, possibly the five-cent package will be ample, while, if the garden consists of a number of vacant lots, the quantity must be increased. Strive to calculate, as nearly as possible, the proper amount of seed to buy, because better results will be obtained if fresh seed is purchased every year.

In the school or the home garden it is very essential to make the most out of a limited area. Economy of space must be considered. The entire ground should be covered

with plants and still have room enough for their proper development, but no more. To determine how much seed should be purchased we must consider the number of varieties of plants, the fertility and the preparation of the soil, and the requirements for each kind of plant that is to be grown.

The Soaking of Seeds.—Sometimes seeds are soaked in water before they are planted. There is only one advantage to this, and that is the gaining of time. The soaking of seeds hastens the sprouting. It is often advisable to soak such seeds as beans, peas, corn, beets, carrots, salsify, and parsnips, and occasionally a few others, in order to make them come up sooner. When seeds are soaked, as a rule they should not be planted until the ground is thoroly warmed up, because if the ground is cold and damp many of the seeds may rot. Seeds should be soaked from two to ten hours, depending upon the variety.

The Testing of Seeds.—The testing of seeds is necessary, if there is any doubt about the germinating power of the seed. Seed testing means the counting out of one hundred seeds from each package and the sprouting of these seeds before planting the remainder, to find out what per cent will grow.

There are several kinds of germinators, but one of the most simple is the dinner plate seed tester. This consists of two large-sized dinner plates, five or six pieces of heavy blotting paper the size of the plates, and two pieces of Canton flannel the same size as the blotters. The seed tester is made by placing two or three pieces of the blotting paper in the bottom of one of the plates, and covering this with one piece of the Canton flannel.

The cloths and the blotters should be well sterilized with boiling water. After thoroly saturating the blotters and the cloth, pour off any surplus water and allow the cloth to cool. Now count out one hundred seeds of each variety you wish to test. Place these seeds on the cloth. Moisten the second Canton flannel cloth in boiling water, and when it is cooled spread it over the seeds. Now lay one or two pieces of blotting

paper over the cloth and turn the other plate upside down over the seeds. The seeds are now ready to germinate. Place the tester containing the seeds in a warm room for a couple of days, and count the number of seeds that sprout. It usually requires from a week to ten days to complete the test. If the seeds are old, or of uncertain origin, it is always well to test them before planting. Since it is impossible to tell whether a seed is alive or dead by looking at it, gardens are often failures because poor seeds have been planted. If the seed had been tested early, this loss could have been avoided.

Fig. 7—A dinner plate seed tester

Planting the Seed.—After the soil has been prepared, select the seed you are going to plant. Secure a number of small stakes and measure off the distance you wish to plant the seed. Now drive stakes into the ground at the points indicated. Walk to the opposite side of your garden and measure off similar distances and place other stakes. Stretch a string from one stake to the other, and make a little furrow with a stick or the handle of the hoe, or a rake, by following along the string. If seeds are to be planted, make the furrow the required depth, which will be determined by the size of the seed and the time of planting it. Place the seeds in the furrow and cover them with soil. Be sure that the soil is firmly pressed over the seeds. If plants instead of seeds are to be set, mark off the rows in the same way as for the seeds.

Now measure the distance for each plant, and set one plant in each place.

Depth of Planting.—The depth to plant a seed depends upon the size of the seed and the kind of soil. Small seeds must be planted very shallow, in fact many small seeds are simply sown on the surface of the soil and never covered with

Fig. 8—Planting seed with the thumb and first finger

earth. Larger seeds must be planted deeper. The time of the year also determines the proper depth. Some seeds are planted deeper late in the season than early in the season, because they must be deep enough to get the proper amount of water to sprout. The kind of soil has an influence upon the depth of planting. In heavy clay soils, seeds cannot be planted as deeply as in the light sandy soils, because the

heavy soils will shut out all of the air and cause the seed to rot when planted very deep. This is not the case with the sandy soils. The following table will give the relative depth of planting garden seeds.

Germination of the Seed.—Germination means the sprouting of a seed. Three requirements are necessary for

Fig. 9—Planting seed from the package

germination: (1) water, (2) air, (3) heat. All of these conditions must be present in the soil before the seed will grow.

Some seeds require larger quantities of water to germinate than others. A few seeds require more heat to grow. The seeds that require plenty of warmth should not be sown early in the season, but the planting should be delayed until the soil is thoroly warmed up. The plants that do the best late in the season are called warm season plants, and the

PLANTING TABLE

Vegetable	Depth of planting (inches)	Time of planting	Method of planting	Seed or plants required for 100 ft. of row	Distance in inches to plant seed
Beans (bush)	1 to 2	May 1-15	Drills	1 pint	2 to 3
Beets	½ to ¾	April 15	Drills	2 oz	¾ to 1
Brussels sprouts	½	March 15	Hotbed	¼ oz	⅛ to ¼
Cabbage	½	March 10	Hotbed	¼ oz	⅛ to ¼
Carrots	½	April 15-30	Drills	1 oz	½ to ¾
Cauliflower	½	April 1	Hotbed	¼ oz	⅛ to ¼
Celery	⅛ to ¼	March to June	Hotbed	¼ oz	1/16 to ⅛
Chard	½ to ¾	April 15	Drills	2 oz	¾ to 1
Corn	1 to 2	April to July	Drills	¼ pint	12 to 30
Cucumbers	¾ to 1	May 15	Drills	¼ oz	12
Eggplant	½ to 1	March and April	Hotbed	¼ oz	⅛ to ¼
Endive	½ to 1	March to August	Drills	1 oz	1 to 3
Kale	½	March and April	Drills	¼ oz	¾ to 1
Kohl-rabi	½	March and April	Hotbed	¼ oz	⅛ to ¼
Lettuce	1/16 to ⅛	March and April	Hotbed	½ oz	⅛ to ¼
Melon (musk)	1 to 2	April and May	Drills	½ oz	12
Melon (water)	1 to 2	April and May	Drills	1 oz	18
Mustard	¼	March to May	Drills	¼ oz	¼ to ½
Okra	1 to 2	April to June	Drills	2 oz	1 to 2
Onion (seed)	½	March and April	Drills	1 oz	¼ to ½
Onion (sets)	1 to 2	March and April	Drills	1 qt	1½ to 2
Parsley	1/16 to ⅛	April and May	Drills	¼ oz	¼ to ½
Parsnips	½ to 1	April and May	Drills	¼ oz	½ to ¾
Peas	2 to 3	March to June	Drills	1 to 2 pints	1 to 2
Peppers	½	March and April	Hotbed	⅛ oz	⅛ to ¼
Potatoes (Irish)	3 to 4	March to June	Drills	5 to 7 lbs	9 to 15
Potatoes (sweet)	3	April to June	Drills	75 plants	14
Pumpkin	1 to 2	April to June	Drills	½ oz	18 to 24
Radish	½ to 1	March to May	Drills	1 oz	½ to ¾
Rutabaga	½ to 1	March and April	Drills	¼ oz	1 to 2
Salsify	½ to 1	April and May	Drills	1 oz	¾ to 1
Spinach	½ to 1	March and April	Drills	1 oz	¾ to 1
Squash	1 to 2	April to June	Drills	½ oz	12 to 18
Tomatoes	½ to ¾	March and April	Hotbed	⅛ oz	¼ to ½
Turnips	¼ to ½	April to June	Drills	½ oz	¼ to ½

seed must not be sown until the ground is well warmed up. The plants that will grow early in the season are called cold season plants. The seeds of the cold season plants do not require as much heat to germinate as the seeds of the warm season plants. Tomatoes, cucumbers, eggplants, peppers, and squash are called warm season plants, while onions, lettuce, beets, and cabbage are called cold season plants.

In order to have the seed germinate well, the soil must be pressed firmly about the seed. Firming of the soil is necessary in order that the seed can get the proper amount of moisture

Fig. 10—Germination of sweet corn

from the soil. If the seed lies loosely in the ground and does not touch the soil particles at many points, water cannot be taken up, and the seed will soon dry out and never sprout.

Time of Planting.—No definite rule can be given as to the exact time of planting the garden. The amateur should be observing and follow the advice of the best gardeners in his particular community. Some plants can stand more cold than others, and consequently can be planted early. Again, one year the season will open up earlier, and at such time it would be safe to plant certain crops, while another year snow might cover the ground and no planting could be done.

It is usually thought that the season advances northward at the rate of about ten miles a day. The extreme range

between the time of planting at the southern and at the northernmost limit is about one hundred and ten days, covering a distance of approximately fifteen hundred miles.

Considering the United States as a whole we find that plants like the cabbage, cauliflower, celery, eggplant, lettuce, peppers, and tomatoes are started in hotbeds during the latter part of the winter and early spring. These plants are then transplanted to the garden later in the season. The seeds of other plants, such as radishes, spinach, beans, potatoes, corn, and many more, should be planted in the open garden, and this is done later in the season to avoid frost.

The time of planting can usually be determined by observing the blooming of our common fruits. Beans, carrots, lettuce, late potatoes, and some other vegetables can usually be planted about the time the apple trees bloom, while beets, onions, peas, early potatoes, and parsnips are usually planted a few days earlier. However, the date for planting will necessarily vary every year and is determined by the season, the climate, the soil, and the kind of plants to be grown.

Thinning of Plants.—Thinning is the removal of any surplus plants. It is an important operation and one that must be practiced in the growing of almost all of the vegetable crops. Plants cannot grow and develop unless they are given the proper space in which to expand. However, it is usually necessary to plant the seed thicker than the plants can permanently remain, in order to insure a good stand. Even when the seeds have good germinating power, it is always advisable to sow the seed thickly because the little seedlings, after they appear above the ground, are often injured from one cause or another. Consequently, if only enough seeds were sown so that the plants would be the proper distance apart, many causes might appear to greatly reduce the stand of plants. For these as well as other reasons, it is well to plant more seeds than can possibly stand, and then practice thinning.

Thinning offers a very excellent means of studying the plants. While the plants are being thinned, carefully examine

all of them, and weed out and discard the weak or sickly ones. Allow only the large, healthy plants to grow and to produce your crop. Thinning is really a process of selection. It gives a uniform stand of plants, a larger yield, and a better quality. Thinning is sometimes practiced in the hotbed, but it is more often done in the open.

REVIEW QUESTIONS.

1. What is the seed?
2. What is the embryo and where is it found?
3. What conditions are necessary for the seed to grow?
4. What do the leaves make?
5. Where are the root hairs found?
6. Upon what does the success of a garden depend?
7. Why should seeds of good quality always be purchased?
8. What determines the quantity of seed that is necessary for the garden?
9. What is gained by the soaking of seeds in water?
10. What kind of seed is usually soaked?
11. How are seeds tested?
12. Describe the dinner plate seed tester.
13. Why is it important that the plates and cloths be boiled before testing the seeds?
14. Describe the methods of marking off the rows in a garden.
15. Upon what does the depth of planting the seeds depend?
16. What seeds should be planted shallow and what ones deep?
17. Name the three conditions necessary for the germination of a seed.
18. Name three warm and three cold season plants and tell when the seeds should be planted.
19. What determines the proper time to plant the seeds in a garden?
20. What makes the time vary each year?
21. Why is thinning important and how does it aid the plant?

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CHAPTER IV.

THE SOIL AND ITS TREATMENT.

The Soil.—Soils are divided into three classes: (1) Clays, (2) loams, (3) sands. The clays are called heavy soils, and the sands are called light soils. The loams are between the clays and the sands, and are neither heavy nor light. The size of the soil particles is the basis for this division. The clays are composed of the smallest soil particles, while the sands are made up of the largest soil particles, and the loams are composed of soil particles which are between the sands and clays in size. The size and the number of the soil particles determine to a large degree the amount of water the soil can hold. The clays have the greatest number of soil particles in a given area, and they can hold the greatest amount of water. The sands have the least number of soil particles in a given area and they will hold the least amount of water.

The clays, because they have a great number of small soil particles and contain a great deal of water, will pack together and often form a hard crust. The sands, on the other hand, have fewer soil particles, which are larger than the clay particles and will not hold as much water but will permit it to drain away. Therefore, the sands do not pack together or form hard crusts like the clays. However, either of these conditions if carried to excess is injurious to the growing plants and should be avoided. This trouble can be overcome by selecting a soil that is neither a pure clay nor a pure sand.

When there is a blending of the soil particles of the sand and of the clay, it is called a loam. If the clay particles form the larger proportion, the soil is called a clay loam, but if the sand particles make up the greater bulk of the soil it is called a sandy loam. A clay loam or a sandy loam then is the best soil for the garden, other things being equal.

The Soil for the Garden.—Many places are found that do not have an ideal soil for the garden. In such locations the soil must be built up and made fertile so it will grow plants. The soil can be improved in several ways—by cultivating, by adding commercial fertilizers, by supplying humus, or by adding barnyard manure.

Fig. 11—The bean seed in well prepared soil. Note the number of soil particles that touch the seed.

All soils, whether they are clays, loams, or sands, must contain humus to be fertile and productive. Humus is hard to define, but it is usually understood as meaning the decaying organic matter in the soil. It is also spoken of as fiber. Humus regulates the physical properties of the soil, and makes it more friable and loose, and increases the amount of water a soil can hold. Humus also helps to warm up the soil in the spring, and it aids in keeping a larger amount of air in the soil, by preventing the soil particles from sticking together and packing down. It prevents the forming of a hard crust on the surface. Humus is added to the soil in two ways: (1) By the spreading of horse manure over the ground and spading or plowing it under; (2) by the planting of green manure crops, such as clover, soy beans, or rye, and plowing them under. Animal manures, such as horse, cow, sheep, or chicken, are the best and should always be used, unless it is impossible to secure them. When animal manures cannot be obtained, the green manure crops should be planted and worked into the soil.

The soil for the garden should be made as rich as possible, both in plant food and in humus. Large amounts of manure applied in the proper way will furnish both plant food and humus. Rotted manure is the best, but fresh horse manure which does not have too much straw in it can be spaded under in the fall or in the early spring. Manure in which sawdust or shavings are used as bedding is not as good as where straw is used.

How to Prepare the Soil.—In order to secure large crops from the garden, the soil must be thickly covered with manure and plowed or spaded eight or ten inches deep. Better results will be obtained if the manure is placed on the garden in the fall and spaded under soon after it is spread on the soil. When the manure is worked up with the soil it will decay during the winter. This makes the soil rich, and it will make more good plant food for the early spring crops. If fall plowing or spading is not possible, spread the manure on the soil during the winter and allow it to remain there until early in the spring. As soon as the soil is dry enough, spade the manure

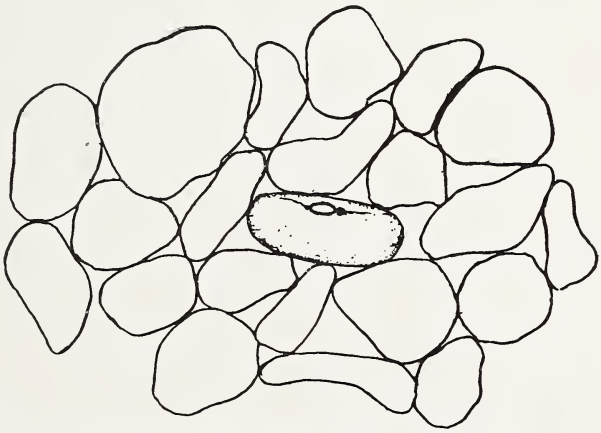

Fig. 12—The bean seed in poorly prepared soil. Note that only a few of the soil particles touch the seed

under to a depth of eight or ten inches. Better and quicker results can be secured if the manure is composted for a year before it is placed on the soil. By composting we mean the piling up of the manure into piles that are four or five feet high and about as wide, and of any length. The sides should be almost straight up and down and the top should slope to the center, so as to collect and hold all of the rain.

The compost pile should be thoroly soaked with water and allowed to stand for three or four weeks, and then it should

be forked over into a new pile. This treatment in which the manure is turned over and stirred up should be given five or six times during the summer. The following spring the manure will be well rotted and in good shape to place on the garden. The composted manure should be spread over the ground in the spring and thoroly worked into the soil. The plant food stored in the compost is easily taken up by the plants and gives excellent results. After the vegetables are up, and late in the season, a top dressing of this compost should be given to the plants. By a top dressing we mean the spreading of one or two inches of the compost on the soil about the plants. The compost is not worked into the soil, but is allowed to lie on the top of the soil. This permits the rain to wash the plant food down around the roots of the plants.

Fig. 13—A spading fork for preparing a small seed bed.

Making the Seed Bed.—The seed bed is an important part in the making of a garden, the reason for this being that many of our garden vegetables are started from seed and that many of these seed are small. The seeds of all plants and especially the small ones must have a well-prepared seed bed, and too much care cannot be given to this part of the garden. The soil particles must be fine and small, so that each seed touches many soil particles. If the lumps of dirt are large the seed cannot absorb enough water to sprout and it never comes up.

As soon as the ground has been plowed, or spaded, it should be harrowed and raked. This is important because if the soil is allowed to dry out before it is harrowed and raked, hard lumps will form which cannot be broken up. A great deal of water will also be lost from the soil by evaporation. Harrowing and raking eight or ten times is not too much. The ground should be raked first north and south, and then east and west. Continue working the soil until it is very fine and all large lumps are broken up. Remove all stones and trash.

Drainage of the Garden.—Drainage is the removal of any surplus water. It is of the greatest importance in the growing of all garden crops, because plants cannot grow and do well if they have wet feet. Many clay soils have poor drainage. These soils are very hard to cultivate. In selecting your garden site, strive to get one that has good natural drainage. Do not pick out a place where the surface of the soil slopes to the center, forming a low place, but select one that is a little higher in the center and will allow the water to run off naturally. If the ground is wet and soggy, do not select it for a garden site, because the plants will not do well. When there is poor drainage the soil is damp and cold. Water shuts out the air and the plants die. When there is good drainage the soil warms up quickly, and there is a good circulation of air, which makes the plants grow rapidly. Good drainage places the soil in a good physical or mechanical state and admits of early plowing and planting. In low undrained land the plants are quickly killed on the approach of cold weather. In well-drained land, the plants can withstand more drouth, because the roots will grow longer and reach out in all directions and go deeper into the soil.

Fig. 14—A garden rake and a garden hoe

Soils differ in their capacity to hold water. As explained previously, clays will hold the greatest amount of water, and they usually contain from thirty to forty-five pounds of water for every one hundred pounds of soil.

Sandy soils under the same conditions will hold from twenty to twenty-five pounds of water for every one hundred pounds of soil. Plant growth is thought to do best in a soil that

contains from thirty-five to fifty-five pounds of water for every one hundred pounds of soil. In case the amount of water is much greater or averages from seventy-five to eighty per cent, it is injurious to plant growth and the soil must be drained.

The soil can be drained in several ways. If the garden is small, the digging of open ditches on the surface, which allows the water to run off, will be sufficient. If larger areas are to be drained, a tile drain should be constructed. The depth to which the tile should be placed in the ground will depend upon the distance it is to run and the character of the soil. Rarely ever will tile drains be necessary if the proper garden sites are selected.

Cultivation of the Garden.—Cultivation is the hoeing, raking, and otherwise digging up of the ground, so that it is in a fine condition. Cultivation of the garden is very important. It kills weeds. It helps make more plant food available for the plant. It holds the soil moisture by preventing it from evaporating from the surface of the soil. This is accomplished by raking the garden often and keeping a dust mulch on the ground. It increases the bacterial action in the soil. It helps to warm up the soil early in the spring. It keeps more air in the soil, which is beneficial to plant growth.

Cultivation can be done with hoes, rakes, and wheel hoes. In small gardens the hoe and the rake will usually be sufficient. In larger gardens the wheel hoe and the hand cultivator should be used. The wheel hoe is more efficient than the hand hoe.

REVIEW QUESTIONS.

1. Name three kinds of soils and tell the difference between them.
2. What are heavy soils and what are light soils?
3. How does loam differ from clay or sand?
4. What kind of soil holds the most water? Why?
5. What kind of soil holds the least amount of water?
6. What soil is the best for a garden? Why?
7. What is meant by the blending of soils?
8. Is a sandy loam soil preferable to a clay loam for a garden? Why?
9. What is humus?
10. How does humus improve the soil?

11. Name the two ways of getting humus into the soil.
12. What is meant by a green manure crop? Name three.
13. What is the best kind of manure for the garden?
14. How should the soil for the garden be prepared?
15. When is the best time to spread the manure on the soil? Why?
16. Why is fall plowing better than spring plowing?
17. Describe how manure is composted.
18. Why should the compost pile be watered and forked over?
19. What is a seed bed?
20. How many times should a seed bed be raked? Why?
21. Why should a garden be well drained?
22. How does poor drainage affect the growth of a plant?
23. How does good drainage improve the soil?
24. What is cultivation?
25. How does cultivation improve the soil?
26. What tools are used for cultivating the soil?

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CHAPTER V.

THE HOTBED AND THE COLD FRAME.

Hotbed.—The hotbed is really a small greenhouse. It is made very low and is used at a time of the year when only a little artificial heat is needed.

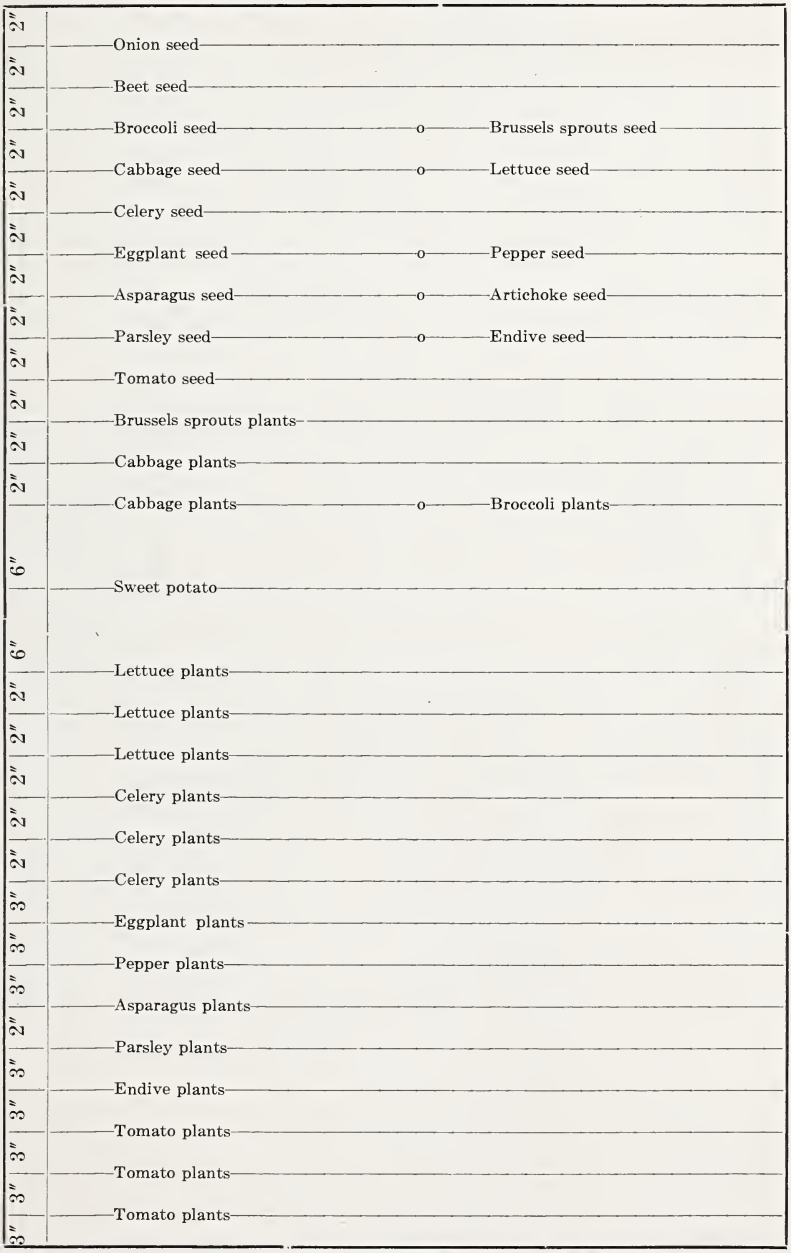
There are two kinds of hotbeds—(1) a temporary hotbed, which is one that is made and used for only a short time, and (2) a permanent hotbed, which is so built that it will last for a long time. A temporary hotbed is usually not as satisfactory as a permanent one but it costs less to build and gives fair satisfaction, especially for certain crops. A permanent one should therefore be constructed, because it gives better results, and can be used for a number of years.

A garden is not complete without a hotbed, and more attention should be given to this form of gardening. Hotbeds are used for the growing of plants out of season. Such plants as radishes and lettuce can be grown to maturity very successfully in a hotbed, both early in the spring and late in the fall. This form of gardening extends the growing season over a much longer period of time. Hotbeds are also used for the growing of early plants, which are later transplanted to the garden. The value of a hotbed for growing plants cannot be over-emphasized. When the hotbed is used to produce early plants, two crops can often be grown from the same land the same season. When plants are started in a hotbed, they mature their crop earlier in the season and therefore bring higher prices.

Location of the Hotbed.—The hotbed should be built in some protected place and located where there is a good supply of water. It should be close to some out-building, if possible. The hotbed should be protected from cold north or west winds. A fence or a building on the west or the north side will give good protection from cold winds. The hotbed should always face the south or southeast, because the sun should

PLAN OF A TWO-FRAME HOTBED.

6x6 feet or 36 square feet.



A suggestive arrangement of plants in a two-framed hotbed or cold frame.

shine on the bed all of the time, so that it will warm up the soil and make the plants grow. If several hotbeds are to be constructed, they should run parallel with each other, with an alley way between them. All hotbeds must be located on a well-drained piece of land, and a slight slope to the south is the best.

Hotbed Pit.—Most hotbeds are heated with horse manure. In order to retain the greatest amount of this heat, the manure is placed in a hole in the ground, called the pit. The pit should be well drained, so that no water will stand in

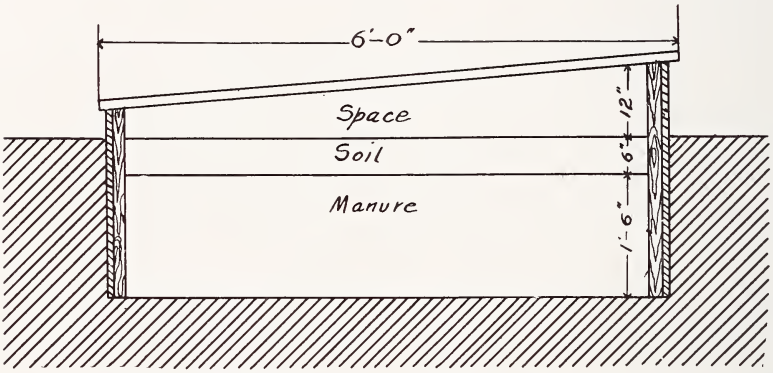


Fig. 15—A cross section of a wooden frame hotbed

the bottom to injure the heating of the manure. If a well-drained location has been selected, the natural drainage will be sufficient. The pit should be dug in the fall before the ground is frozen, because it will be needed before the frost is out of the soil in the spring. Leaves or coarse manure should be placed in the pit as soon as it is dug, so as to prevent any hard freezing of the ground. In the early spring, the leaves are easily removed from the pit, and it is ready to receive the manure.

The depth to which the pit should be dug is determined by the section of the country, the length of time the hotbed is to be used, and the crop that is to be grown. In the South

the pit is dug from six to twelve inches in depth, while in the North the depth varies from fifteen to thirty-six inches.

Where warm season plants, such as the tomato or pepper, are to be grown, at least twelve inches of manure should be used in the northern sections, while in the South the depth can be less.

The size of the pit varies. It is regulated by the size of the sash. If the standard hotbed sash is used, the pit should be six feet wide and as long as desired. The stand-

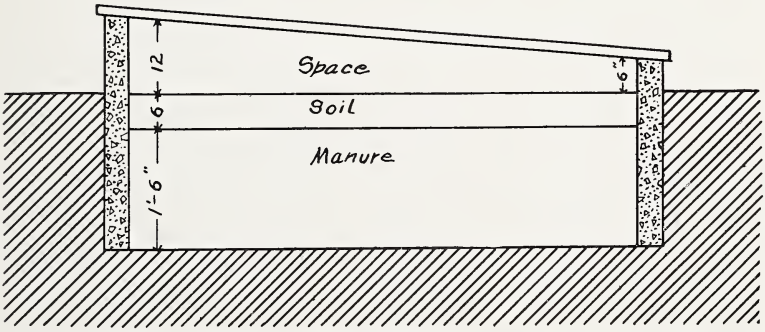


Fig. 16—A cross section of a concrete hotbed

ard sash is 3x6 feet, and the grower should gauge the size of the hotbed pit by the number of sash.

Hotbed Frame.—The frame of the hotbed fits into the pit. It is made of wood, concrete, brick, or stone. Wood is the least durable. Concrete is preferable and lasts longer than wood. Whenever possible, the frame should be made of concrete, altho wood is used a great deal. If the frame is made of wood, the most durable kinds, such as locust, chestnut, or cypress, should be selected. A standard size for the wood frame, especially in the central and northern states, is twenty-four inches high on the south side and thirty inches on the north side. The back side is usually made of two boards twelve inches wide and one board six inches wide, and the lower or south side is made of two boards twelve inches wide.

These dimensions give a slope of six inches for the glass. When the hotbed is made of wood and of any great length, crossbars should be used. Crossbars are made of pieces of wood three inches wide and one inch thick, and nailed to the front and back to reinforce the frame. Concrete frames are made the same size. The back side should be six inches higher than the front side. The concrete walls should be four or five inches in thickness.

The depth of a concrete frame should vary according to the locality and the crop which is to be grown. Usually the back side varies from thirty to thirty-six inches and the front side from twenty-four to thirty inches in height. A fall of six or eight inches is necessary, and the inside dimensions of the frame should be so made as to use all of the glass surface.

Hotbed Sash.—The sash of the hotbed should be made of the most durable wood. Cypress or cedar is the best. The size of the sash varies, but the standard sizes are 3 feet by 6 feet, and 3 feet 2 inches by 6 feet. Sash any larger than these are troublesome to handle. The usual thickness of the lumber in the sash is one and three-eighths inches and one and one-half inches. The one and three-eighths inch sash are rather light and are not as good as the heavier ones.

The glass is put into the sash in two ways, either butted or lapped. Butted glass is glass in which the two ends of the panes are shoved together until they meet. Unless the ends of the panes of glass fit very closely, there will be a great deal of leakage, and leakage is very injurious to the plants. Leakage means the dripping of the water between the cracks of glass when it rains. Lapped glass is placed in the frame in the same way that shingles are nailed on a roof. Each pane of glass laps over the other pane in the fashion of shingles. This method is recommended over the butted glass, because the panes fit more tightly and the rain is shed much better. If the work is done well no leakage will occur. The glass should be lapped about one-eighth of an inch, fastened in the sash with glazing points, and then puttied well along the edges. All sash should be given two or three coats of good

white lead paint. The paint makes the sash look better and last longer.

Manure and Its Preparation for the Hotbed.—Nothing but good fresh horse manure should be used to make the hotbed. Sometimes other materials are selected, but they are not as good as the horse manure. The manure should be

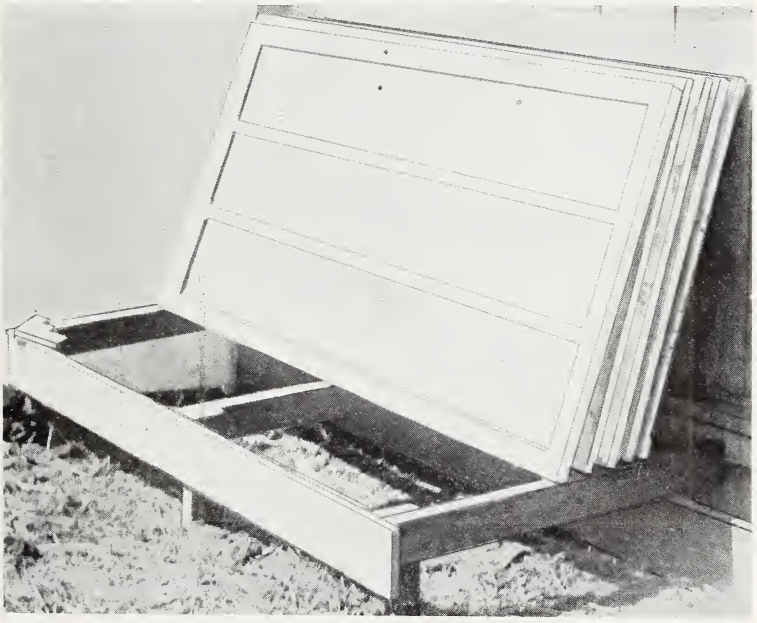


Fig. 17—A good rack for hotbed sash

strictly fresh, and it should not have too much litter or straw mixed with it. Two-thirds solid matter and one-third straw is about the proper mixture. Manure with shavings or sawdust as the litter is never satisfactory and should not be used.

The manure should be secured from a week to ten days before it is to be placed in the hotbed pit. This is necessary

in order to compost it. To compost the manure, pile it up into piles four or five feet wide and three or four feet high, and as long as is necessary in order to fill your beds. After the manure has remained in the compost pile for two or three days it will be steaming. When the manure begins to steam it is ready to be forked over into a new pile. Begin at one end of the pile and fork all of the manure over, so the outside

Fig. 18—Students filling a concrete hotbed pit

of the old pile will be in the center of the new pile. If the manure is dry add water to it at this time. Be careful and do not add too much water, but only enough to moisten it so that no burning of the manure will take place. In from twenty-four to thirty-six hours the second pile will be very hot and steaming likewise. The pile should now be forked over into a third pile, observing the same principles that you did the first time. In a day or so the pile will again be very hot, and the manure will be in the proper condition to put into the hotbed pit.

Filling the Hotbed Pit.—The proper filling of the hotbed pit is very important. If the manure is improperly placed in the pit, failure will be the result. Begin the work of filling by first leveling off the bottom of the pit. Be sure there is good drainage. Now throw in a six inch layer of the composted manure. Step into the pit, and firmly pack the manure down over the whole bed, along the sides, and in the corners. Firming of the compost can be most successfully accomplished by tramping it down with the feet. Now throw in another layer of about the same thickness as the first one, and tramp it down firmly. Continue throwing one layer after another into the pit until it is filled up to within 8 or 10 inches of the top of the lowest side, tramping each layer after it has been thrown into the pit. When the manure is all in the pit, spread from 4 to 6 inches of good garden soil over the manure, and put the sash on the frames. If flats are to be used in the growing of your plants, one inch of soil on the manure is sufficient. A soil thermometer should be purchased and placed in the manure to determine the amount of heat in the compost. Careful observation will reveal the temperature in the hotbed to be from 100 to 110 degrees F. The high temperature is due to the secondary heating which is taking place. After a few days the temperature will fall down to 75 or 80 degrees F. and it will require from a week to ten days for the temperature to fall low enough to plant the seed. When the temperature of the manure has reached 70 or 75 degrees F. the hotbed is ready to plant the seed.

Fig. 19—A soil thermometer

Ventilating the Hotbed.—Ventilation is supplying the plants with fresh air. This is very important if good plants are to be grown. Ventilation should be given gradually and on days that are warm and bright. Ventilation is first given by raising up every alternate sash about one inch on the upper side of the hotbed. The height to which the sash is raised should be increased as the days get warmer. Late in the season, when the days are warm, all of the sash should be taken off, and the plants exposed to the air and sun. On warm nights, the sash should be allowed to remain off of the hotbed. Fresh air should be given regularly, because it is as important for plants as it is for animals.

Cold Frame.—The cold frame looks like a hotbed, but differs from it in having no artificial heat. The cold frame

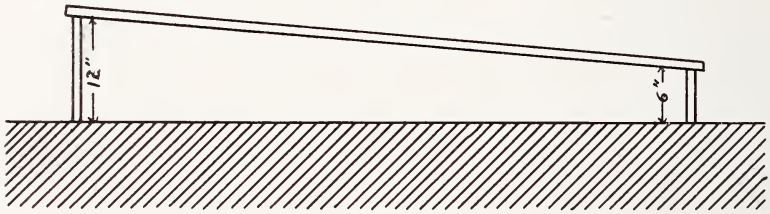


Fig. 20—A cross section of a cold frame

requires no pit or hole, but it is set on the top of the ground. A cold frame is used later in the season than a hotbed, and it is valuable in the growing of hardy plants like the cabbage and the lettuce. A cold frame is also used for the hardening off of the plants that have been started in the hotbed.

The location and the arrangement of the cold frame is the same as that of the hotbed. The drainage should be good. A cold frame is cheaper to build than a hotbed, because no pit is dug and no manure is used. All of the heat that is used to force the plants comes from the sun. The soil in the cold frame should be rich. A sandy loam with plenty of humus is the best. The plants can be grown in the soil of the cold frame, or in flats which are set in the frame. A cold frame is usually made of boards, the same as a hotbed. A board 12

to 14 inches wide is used for the back side and one 6 to 8 inches wide for the front side. The size of the cold frame should be the same as that of the hotbed. Sash the same size as those of the hotbed are used. Occasionally, late in the season, heavy canvas is substituted for the glass. The cold frame should be ventilated the same as the hotbed.

Hardening the Plants.—All plants must be well hardened off, before they are planted in the garden. Hardening off is done by exposing the plants gradually to the outside air and the sun. The water supply must also be partially withheld. The withholding of the water causes the plant to

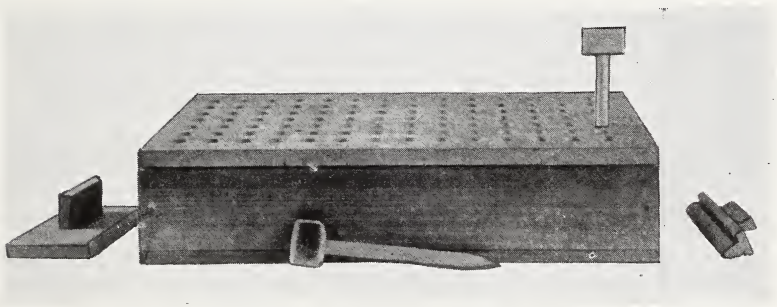


Fig. 21—Transplanting board, dibbler, firming board and marker

grow slowly, and the cell walls to thicken up, as well as to reduce the amount of water that is in the tissue of the plant. Hardening off is a most important operation. Many plants, if not thus treated, will die when they are transplanted to the garden. The sash should be raised daily, each day increasing the height to which they are raised. As the days get warmer remove the sash entirely, but cover up the plants again at night. Later in the season, when there is no danger of frost, the sash should be left off during the night. Do not water too often, but only when the plants seem to show the need by slightly wilting. Never sprinkle the plants frequently, but rather water thoroly and less often.

Plants like the cabbage, cauliflower, and lettuce can be started in the hotbed and hardened off in the cold frame. This is done by planting the seed of such plants early, in the hotbed, and then transplanting the seedlings to the cold frame. Where no bottom heat exists the plants do not grow as fast, and, consequently, harden off much better. Tomatoes, peppers, and eggplants are usually hardened off in the hotbeds, altho they can be hardened off in the cold frame late in the season.

Fig. 22—Seedlings the proper stage for the first transplanting

Transplanting of Plants.—Transplanting is the replanting of plants. It is an important operation and great care should be used in doing it. Plants will grow much better and will stand the operation with less check if they are transplanted while they are young. The younger the plant, the better it will transplant. The proper time for the first transplanting of the seedling is when the second or third leaf appears. The seedling should be removed carefully from the soil and it should be placed a little deeper in the soil when it is transplanted. A good rule to follow is to place the seedling in the soil almost to the first leaves. Be careful to see that the heart of the plant is not covered up with the soil. The soil must be pressed firmly about the roots. Thoro watering is necessary after every transplanting, and the plants should be shaded with paper for a couple of days after they are reset. The transplanting of the plants to the field is likewise important. Here again they should be placed a little

deeper than before. When it is possible to water after transplanting to the field, a better stand will result. Press the soil well about the roots and transplant to the garden in the evening or on a cloudy day. The first transplanting of the

Fig. 23—The transplanting of seedlings after the marking board has been removed

seedling is done with the fingers, but when the plants are set in the field, they are usually transplanted with the aid of a dibbler or a trowel.

Transplanting is valuable because it will make stronger plants. The root system is more compact and a great many feeding roots are developed. Transplanting permits the plants

to grow faster and to mature earlier. If plants are not transplanted, the root system is weak, the plants are spindly, and often become leggy. They give the appearance of being sick, by falling over on the ground. A weak, spindly plant will never produce a profitable yield. Good plants are the secret to success, and plants must be transplanted in order to be strong.

Fig. 24—A dibbler and a trowel

The use of water when transplanting should not be overlooked. It is always better to set the plant first, firm the soil well about the roots, and then water it. The watering of the plant after it is reset is better than pouring a little water in the hole before the plant is set in the soil. If a plant is transplanted with the aid of a dibbler, the soil can be firmed about the roots by forcing the dibbler down close to the plant and pressing the soil against the root. When the dibbler is removed, a hole is left into which the water can be poured and easily reach the roots of the plant.

REVIEW QUESTIONS

1. What is a hotbed?
2. What is the difference between a temporary and a permanent hotbed?
3. For what are hotbeds used?
4. Why should a hotbed be near to some building?
5. How is a hotbed heated?
6. How deep should the pit be dug?
7. Of what kinds of material is the hotbed frame made?
8. What is the difference between lapped and butted glass?
9. What kind of manure should be used for the hotbed? Why?
10. Describe how to properly prepare the manure.
11. How long should the manure be secured before the hotbed is needed?
12. How must the manure be piled to compost it?
13. Why is it important to have the manure packed down?
14. What temperature did you find the manure in your hotbed?
15. What is ventilation?
16. Why must plants be ventilated?
17. How does a cold frame differ from a hotbed?
18. Why must plants be hardened off before they are planted in the garden?
19. When is the best time to do transplanting?
20. What is gained by transplanting?

REFERENCE:

Bulletin No. 30, Vol. II, Cornell Reading Course.

CHAPTER VI

PLANTS THAT SHOULD BE STARTED IN THE HOTBED OR THE COLD FRAME

There are two classes of plants grown in the hotbed and the cold frame: (1) Those plants that are grown to maturity, such as radishes, lettuce, and beets, and (2) those plants, the seed of which is sown in the hotbed and the seedlings transplanted later to the garden. Such vegetables as the artichoke, aspara-

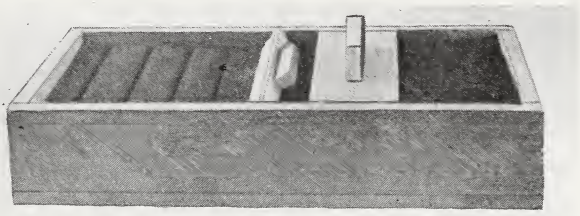


Fig. 25—A flat showing a well prepared seed bed, a firming board, and a marker. The little furrows are made the proper depth for the seed by the use of the marker

gus, broccoli, Brussels sprouts, cabbage, cauliflower, kohl-rabi, eggplant, lettuce, onion, pepper, tomato, and endive should be started in the hotbed, and when the plants have grown to the proper size they should be transplanted to the garden.

Artichoke (Globe).—The seed of the globe artichoke should be started in the hotbed, if the crop is to be harvested the first year. The seed should be sown about one to one and one-half inches deep, in March or April. As soon as the plants begin to show the second leaf, they should be transplanted to small flowerpots. Allow the plants to grow in these pots until the roots crowd, then transplant them into larger sized pots. When the plants have grown stalky set them in the garden.

Asparagus.—In order to grow large, healthy plants, the asparagus should be started in the hotbed. Sow the seed in March or April to a depth of one to one and one-half inches in good rich soil. The seeds should be placed about one-half inch apart in the rows, and the rows two inches apart. In most cases transplanting of the seedlings will not be necessary until the plants are set in the permanent bed in the garden. However, if the seeds are sown too thickly, better plants will be grown by transplanting the seedlings three inches apart in the cold frame, before they are set in the garden. If the seedlings are to be transplanted before they are set into the permanent bed, the seed can be sown earlier in the hotbed.

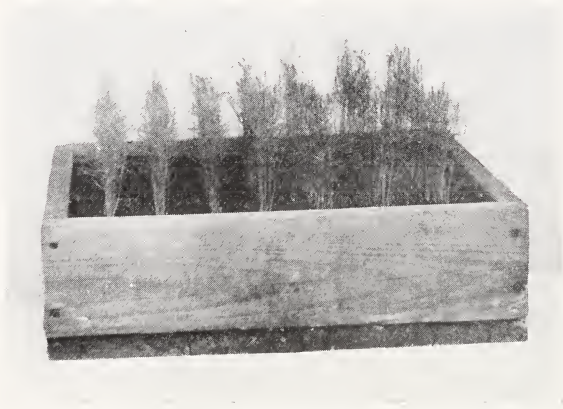


Fig. 26—A flat of seedling asparagus plants

Beet.—The garden beet is often started in the hotbed. When early beets are desired, plant the seed in the hotbed in February or in March. The seeds should be sown one inch deep, and one-half to one inch apart in the rows. The rows should be two and one-half inches apart. The beets will require no transplanting until they are set in the garden. Cut off about one-half of the top before the plants are set. This method will prevent the loss of too much water. The plants must be well hardened off. They should not be set in the open until all danger of frost is past. This method of growing beets produces an excellent early crop.

Broccoli.—Broccoli closely resembles cauliflower, but the heads are smaller and the quality slightly inferior. The seeds

should be sown in March, to a depth of one inch. They should be placed one-eighth of an inch apart in the rows, and the rows two inches apart. As soon as the first true leaf appears, the seedlings should be transplanted two inches apart each way, either in flats or directly in the bed. The seedlings should be set in the soil almost to the seed leaves, and the soil pressed firmly about the roots. Water thoroly, and shade the plants by placing paper over them for a few days. The seedlings should be well hardened off and ready to plant in the garden in April or May.

Brussels Sprouts.—Brussels sprouts are very delicate plants, but comparatively hardy. The seeds should be sown in

Fig. 27—A flat of seedling cabbage plants

April to a depth of about one-half inch and placed one-eighth to one-fourth of an inch apart in the rows. The rows should be two inches apart. When the second leaf appears, transplant the seedlings two inches apart each way. Press the soil firmly about the roots, and water the seedlings thoroly. Shade the plants with paper for a few days, until they get started. Harden off the plants well before they are transplanted to the garden, which should be done in late May or early June.

Cabbage.—Early cabbage plants are always started in the hotbed. The seeds can either be sown in the hotbed or be planted in flats and the flats placed in the hotbed. After thoroly preparing the seed bed, mark off the rows and plant the seeds one-half to one inch deep, and cover them with soil.

Press the earth well around the seed and water thoroly. The seeds should be placed about one-eighth to one-fourth of an inch apart, and the rows should be two inches apart. The seed should be sown from February 15 to April 1, depending upon the locality. When the plants are up, and the first true leaf is just appearing, transplant the seedlings two inches apart each way. When transplanting, place the plants a

Fig. 28—Cabbage plants grown in paper pots

little deeper than they were in the seed bed, and be sure to press the soil firmly about the roots. Water thoroly, and shade the seedlings by placing a paper over them until they have taken root. It requires from thirty to forty days before the plants are ready to set into the garden.

Cauliflower.—The cauliflower belongs to the cabbage family. The plants are handled in much the same way. The seed should be planted one-half of an inch deep and from one-eighth to one-fourth of an inch apart in the rows. The rows should be two inches apart. As soon as the first true leaf appears transplant the seedlings two inches apart each way. Set the plants in the soil a little deeper than they were in the seed bed and press the soil firmly about the roots. Water

thoroly and shade the plants with paper for a few days. Thoroly harden off the plants before they are transplanted to the garden. The seed should be sown in the hotbed in March, because it requires from thirty to forty days before the plants are ready to set in the garden.

Celery.—Early celery plants should be started in the hotbed. If good plants are expected, they must be transplanted once or better twice before they are set in the garden. Sow the early varieties in the hotbed in February or March. The seeds should not be covered with earth, but merely pressed into the soil. Since they are very small, great care must be exercised in handling them. The seed should be sown rather thickly, and when the plants are large enough to handle they should be transplanted. Pinch off the taproot at the first transplanting. This will make a compact, fibrous root system, which produces a stalky plant. Set the seedlings one inch apart each way the first time they are transplanted. Later transplant them again, setting the plants two inches apart each way. Press the soil firmly about the roots of the plants after each transplanting. This treatment will give stalky, robust plants.

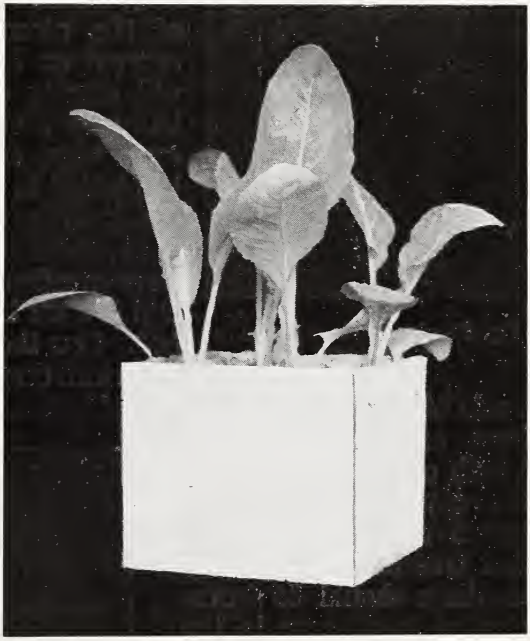


Fig. 29—Cauliflower plants grown in a berry box

Fig. 30—An eggplant grown in a flowerpot

Shading the plants with paper or some other material, and thoroly watering them after each transplanting, is necessary. Always keep the dirt away from the heart of the plant, because if it is covered up by the soil the plant will usually die. Plants for the late crop should be grown in the same way, except that they can be started in a well-prepared seed bed in the garden.

Eggplant.—The eggplant is a warm-weather, long-season plant, and it must be started in the hotbed. Sow the seed about one-half of an inch deep sometime in March. Seeds of the common varieties of eggplants should be spaced from one-eighth to one-fourth of an inch apart in the rows, and the rows two inches apart. When the first true leaf appears, the seedlings should be transplanted in flats or in the hotbed three inches apart each way. Better and stronger plants can be produced if the seedlings are transplanted into small flowerpots and later shifted to larger ones. If the plants are grown in flowerpots there is less check in growth when they are set in the garden. The soil must be pressed firmly about the roots of the plants each time they are

Fig. 31—An egg plant grown in a paper pot

transplanted. Watering and shading of the plants is important. The eggplant requires from six to eight weeks after the seed is sown before the plants are ready to set in the garden.

Lettuce.—The lettuce is a short-season, cool-weather crop. It is grown in several ways. Earlier plants and finer heads can be raised if the seed is sown in the hotbed. The seed is very small and should be pressed into the soil, and never covered up with earth. If the seed is planted deep, the little seedlings are not strong enough to push thru the soil. The

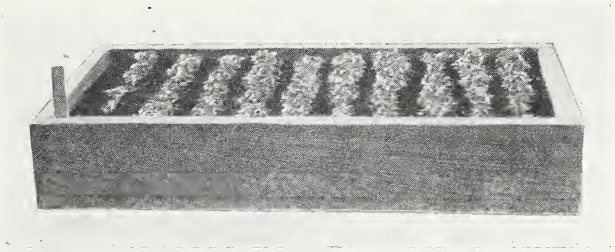


Fig. 32—A flat of seedling lettuce plants

seed should be sown thinly in the rows and the rows two inches apart. The last of February or the first of March is about the proper time to sow lettuce. As soon as the seedlings come up, and when the second leaf appears, transplant them one inch apart in the rows, and the rows two inches apart. Press the soil firmly about the roots and water the plants thoroly. Shading of the plants with paper will be of great value. The seed should be sown four or five weeks before the plants can be set in the garden. The plants should be well hardened off before they are set outside.

Onion.—One of the most recent methods of growing onions is to start the plants in a hotbed. This way of growing onions is not suited to all types, but certain varieties lend themselves to this treatment. The Prizetaker onion seems to be the best variety for transplanting. The seed should be sown one-half to one inch deep in February or March.

The rows should be spaced two inches apart. The seed should be sown rather thickly, because the onion is a slow grower during its early life and will stand crowding for a short time. The plants should be well hardened off before they are set in the garden. The onion is a cool-season plant, and it will stand a great deal of cold weather without injury. When the plants are three or four inches high, they are ready to set in the garden. Do not set the plants out too early, altho if properly hardened off they will withstand considerable frost. The plants should be transplanted three or four inches apart in the rows and the rows twelve to fifteen inches apart when they are set in the garden. Cut off one-half of

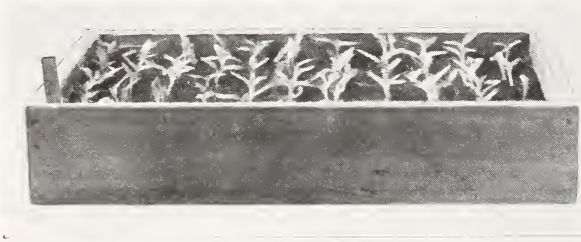


Fig. 33—A flat of pepper plants after the first transplanting

the tops (Fig. 45) and firm the soil well about the roots when transplanting.

Parsley.—Parsley of superior quality can be grown if the seed is first sown in the hotbed. Sow the seed one-fourth inch deep during March or April. The seed should be spaced from one-eighth to one-fourth of an inch apart in the rows and the rows two inches apart. When the second leaf appears, transplant the seedlings two inches apart, either in flats or in the hotbed. If the seedlings are transplanted in flowerpots, the plants do not receive a check in growth later, when they are transplanted to the garden. Be careful to firm the soil well about the roots. Do not break off the taproot. Water thoroly and shade the plants with paper until they get established. When all danger of frost is over, and the plants

are well hardened off, set them in the garden six inches apart in the rows and the rows one foot apart.

Pepper.—The pepper is a warm-weather plant. It requires a long season in which to produce its largest crop. In order to produce a good yield of peppers, the seed must be sown in the hotbed. The time of sowing the seed varies with the locality. As a rule, if the seed is sown sometime in March, large, vigorous plants will be produced. The seed should be planted about one-half of an inch deep in a well-prepared soil, either in the hotbed or in a flat which is set in a hotbed. The seeds should be spaced about one-eighth of an inch apart in the rows, and the rows about two inches apart. When the first true leaf appears, the seedlings should be transplanted in flats, or in the hotbed, three or four inches apart each way. The plants will receive less check in transplanting to the field if the seedlings are planted in flowerpots, and shifted to larger ones as the plants outgrow the pots. Usually a four or five inch pot will be large enough to grow the plant until it is set in the garden.

Fig. 34—A pepper plant grown in a flowerpot

The young plants are rather tender and need careful attention. Good ventilation should be given to the seedlings and care must be exercised not to overwater them, especially when they are small.

The pepper requires from six to eight weeks after the seed is sown, before the young plants are large enough to transplant to the garden.

Sweet Potato.—Sweet potato plants are tender to frost and must be started in a hotbed. They are rather difficult to grow, owing to the fact that usually a large percentage of

the roots decay. The sweet potato is rarely ever started from seed, but the tuberous roots are planted in the place of seed. The sweet potato plants are grown by setting the roots in a mild hotbed. The potatoes are planted whole, and to a depth of two inches. The rows should be six to eight inches apart,

Fig. 35—A sweet potato showing the slips the proper size to set in the garden

and the potatoes two or three inches apart in the rows. Instead of having good, rich soil for the seed bed, it is much better to plant the sweet potatoes in clean, pure sand, with two inches of good garden soil over the sand. Do not have any organic matter in the seed bed, because it will make the sweet potatoes rot. The temperature of the hotbed should be kept at 80 or 85 degrees F. for a number of days. Water

the potatoes thoroly when they are planted. In a short time, many slips will appear above the ground. When they have grown to a height of six inches, they are removed from the mother root and set in the garden. Strive to keep as many of the little roots on the slip as possible and do not injure the mother root any more than is necessary. In a short time, a second crop of slips will appear, and they can be removed and transplanted to the garden. However, the second or third crop of slips is not as good as the first, and when room is available, it is advisable to grow enough plants so that only the first slips are needed. Do not transplant the slips to the garden until all danger of frost is past. The sweet potatoes should be planted six or seven weeks before time to set the plants in the garden.

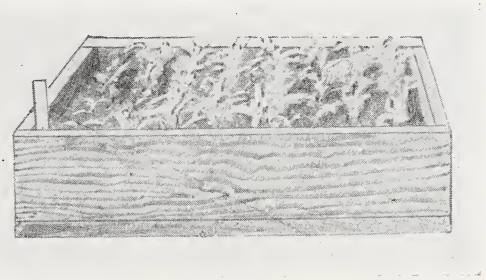


Fig. 36—A flat of seedling tomato plants

Tomato—Tomato plants must be started in the hotbed if good early plants are desired. Since the highest price is paid for the early fruit, it is advisable to plant the seed early. The seed should be sown from six to ten weeks before time to set the plants in the garden. However, the time the seed should be sown will be determined to a certain extent by the way in which the plants are to be handled. If they are to be transplanted two or three times, the seed should be sown earlier than if the plants are to be transplanted only once before they are set in the garden. The seed is usually sown in March, to a depth of one-half of an inch. Place the seeds from one-eighth to one-fourth of an inch apart in the rows and the rows two inches apart. When the first true leaf appears, transplant the seedlings two inches apart each way, either in flats or in the hotbed. Press the soil firmly about the roots

and shade the plants for a few days until they take root. Better and stronger plants can be produced if each plant is placed in a flowerpot or a dirt band. If extra early fruit is desired the seed should be sown in February, and the plants transplanted in small flowerpots, and gradually shifted to larger ones until four or five inch pots have been reached. If the plants are carefully grown, they will often have small fruits before they are set in the garden.

Fig. 37—A tomato plant removed from a flowerpot and ready to set in the garden. Note the root system

After each transplanting, firm the soil well, and thoroly water about the roots of the plants. Be careful to see that the plants are well hardened off, before they are set in the garden. This is usually done by withholding the water supply, and exposing the plants to the air and the wind. Scanty watering with just enough to keep the plants from wilting is recommended. Exposing the plants to the air and the sun by removing the sash aids greatly in the hardening off of the plants. The sash should be removed every day, and on warm nights. A few days before transplanting, withhold all water and let the soil dry out, and a couple of hours before setting the plants in the garden soak the soil about the roots of plants thoroly.

REVIEW QUESTIONS

1. Name the two classes of plants that are grown in a hotbed.
2. Why should globe artichoke be started in a hotbed?
3. How many times should the asparagus seedlings be transplanted?
4. What is the reason for sowing beet seed in the hotbed?
5. What is gained by cutting off part of the leaves of plants before transplanting?
6. Describe how broccoli plants are raised.
7. Describe how Brussels sprouts plants are grown.
8. How should early cabbage plants be treated after they come up?
9. How long a time is required to grow cabbage plants?
10. Does the growing of cauliflower plants differ from the growing of cabbage plants?
11. Why should the celery plant be transplanted several times before setting in the garden?
12. What is gained by pinching off the taproot of the celery plant?
13. Describe the growing of the eggplant.
14. What is gained in sowing lettuce seed in a hotbed?
15. How are onions treated when the plants are started in the hotbed?
16. Describe the growing of parsley plants.
17. Describe the method of raising sweet potato plants.
18. Describe the growing of tomato plants.

CHAPTER VII

SPRAY MATERIAL AND SPRAY MACHINERY

Practically every plant that is grown in the garden is subject to the attack of either a disease or an insect. Many of these troubles can be held in check by the use of the proper material, sprayed or dusted on the plant, at the right time and in the proper way.

If a disease or a sucking insect is the cause of the trouble, the first symptom will be seen in the leaves turning yellow. After a short time the plant wilts and dies. If eating insects are the cause of the trouble, their presence can be detected by the holes that are eaten in the foliage of the plant. Whenever the plant looks sick, it must be carefully examined to determine what the trouble is, and then apply the proper remedy.

Kinds of Insects.—Insects that attack plants are divided into two classes: (1) Eating insects, which are insects that eat up the leaves or the fruit of the plant; (2) sucking insects, which are insects that suck out the plant juices, and cause the plant to die. Each class of insects must be treated differently, and several remedies are used for each kind.

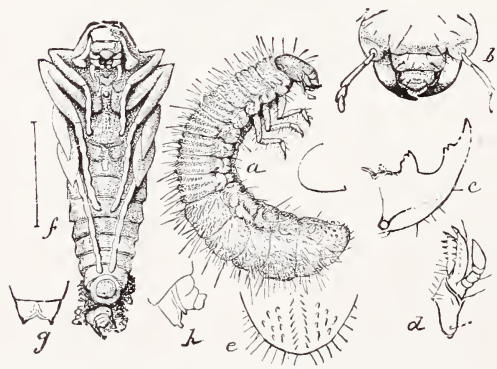
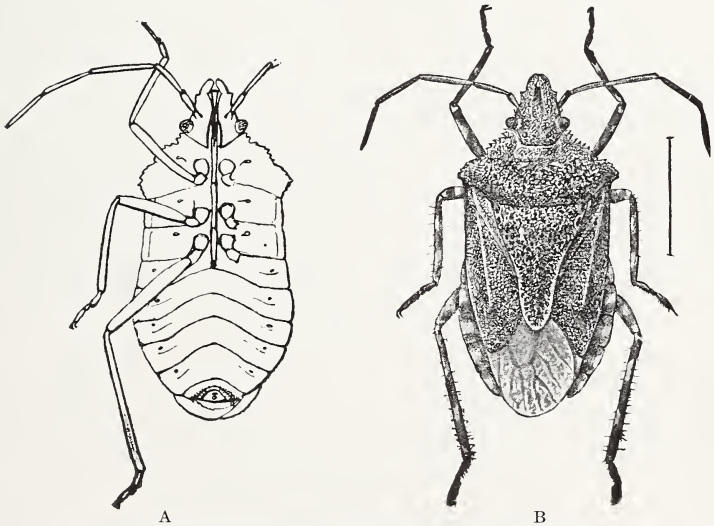


Fig. 38—A beetle with biting mouth parts: a, full grown larva; b, head of larva; c, left jaw; f, pupa (After Riley)

Eating Insects.—The eating insects can be controlled by applying some poison to the leaves, stems, and fruit of the plant, so that the insects eating these parts will take the poisoned

food into their stomachs, and die from the effect of the poison. Paris green and arsenate of lead are the two most common poisons used for this class of insects. However, several other poisons are sometimes recommended. A few of the common eating insects which are likely to be found in the garden, are the asparagus beetle, the bean weevil, the flea beetle, the cabbage worm, the carrot beetle, the cucumber beetle, the



A B

Fig. 39—An adult insect with sucking mouth parts
A, the lower side showing the sucking tube; B, the upper side

potato beetle, and several more. All of these insects can be killed by spraying the plants with either Paris green or arsenate of lead.

Sucking Insects.—The sucking insects can be controlled by applying some spray that will kill the insect by touching its body, or by coating its body over with the material so the insect cannot breath. Stomach poisons are of no value, because the insects do not eat the plant. Tobacco solutions, kerosene emulsion, and soap solutions are among the common remedies for this class of insects. Some of the common suck-

ing insects of the garden are the plant lice, the plant bugs, and several more.

Plant Diseases.—The diseases of plants are caused by parasitic plants growing on the vegetables and sapping the life out of them. Some diseases make the leaves turn yellow and die. Other diseases cause the plant tissue to break down and rot, and still other diseases cut off the water supply of the plant, and cause it to wilt and finally die. Many plant diseases that produce dead spots on the leaves and often destroy the plant, can usually be controlled by spraying with Bordeaux mixture. Spraying, however, must begin before the disease gets a start, or the plant may die even if the treatment is given. The plants that show wilting, due to a disease, must usually be pulled up and burned, because no spray will help this kind of disease.

Sprays for the Plant and How to make Them

POISONS FOR BITING INSECTS

ARSENATE OF LEAD

Arsenate of lead	2 to 5 ounces
Stone lime	4 to 6 ounces
Water	4 to 6 gallons

HELLEBORE

When used as a powder

White hellebore	1 ounce
Air-slaked lime or flour	5 ounces

When used as a spray

White hellebore	1 ounce
Water	3 gallons

PARIS GREEN

When used as a powder

Paris green	1 ounce
Air-slaked lime or flour	10 to 15 ounces

When used as a spray

Paris green	1 ounce
Stone lime	2 ounces
Water	6 to 8 gallons

PYRETHRUM

When used as a powder

Pyrethrum	1 ounce
Air-slaked lime or flour	5 ounces

When used as a spray

Pyrethrum	1 ounce
Water	2 gallons

POISONS USED FOR SUCKING INSECTS

BLACK LEAF 40

Black Leaf 40	1 part
Water	500 to 800 parts

CARBOLIC ACID EMULSION

Hard soap	½ pound
Crude carbolic acid	½ pint
Hot water	2 quarts

Dissolve the soap in the hot water and add the carbolic acid. Churn the mixture until it becomes creamy and does not separate. This formula makes a stock solution. For use, dilute one part of the emulsion to thirty parts of water.

This spray is used principally against the cabbage maggots, cabbage worms, and several other of the soft-bodied insects.

COMMON SOAP MIXTURE

Hard soap	½ pound
Water	4 gallons

Dissolve the soap by boiling it in the water. This mixture is used on some soft-bodied insects like the plant lice and occasionally on the red spider.

KEROSENE EMULSION

Kerosene	1 gallon
Water	2 quarts
Hard soap	¼ pound

Cut the soap into thin slices and place it in the water. Heat the water until the soap is all dissolved. *Remove the water from the fire,* and add the kerosene. As soon as the kerosene is added to the mixture, churn it violently until it gets milky. This is your stock solution. For a summer spray dilute one part of the above mixture to twenty parts of water.

TOBACCO DECOCTION

Tobacco stems	1 pound
Water	2 gallons

Boil the tobacco stems in the water for half an hour, until all of the strength is out of them. Strain the liquid and add enough water to make two gallons. This spray is used chiefly against the plant lice.

SPRAYS FOR PLANT DISEASES

BORDEAUX MIXTURE

Copper sulphate (bluestone)	$\frac{1}{2}$ pound
Stone lime	$\frac{1}{2}$ pound
Water	6 gallons

Dissolve the copper sulphate in three gallons of water, and the stone lime in the remaining three gallons of water. When both materials are dissolved, mix the two solutions and stir thoroly. The mixture is now ready to spray on the plants.

COPPER SULPHATE OR BLUESTONE

Copper sulphate	$\frac{1}{4}$ pound
Water	7 gallons

Copper sulphate is occasionally used as given in the above formula. However, it should only be used in special cases

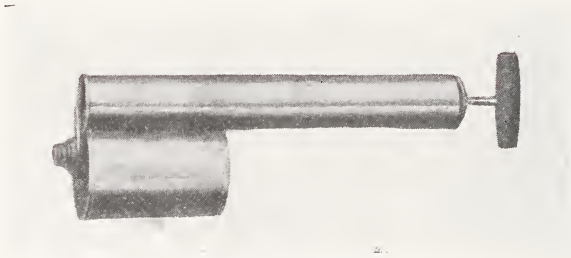


Fig. 40—Hand atomizer

on plants that are dormant, because it will kill the leaves if sprayed on green foliage.

CORROSIVE SUBLIMATE OR BICHLORIDE OF MERCURY

Corrosive sublimate	1 ounce
Water	8 gallons

This solution is used especially for the soaking of seed potatoes to kill the scab or rhizoctonia.

FORMALIN

Formalin (40 per cent)	½ pint
Water	15 gallons

This solution is used principally for the soaking of seed potatoes to kill the potato scab.

Spray Machinery.—There are many kinds of spraying outfits. These outfits may vary from the small hand sprayer to the large power machines. For the small garden, only the hand sprayers are necessary, and they do very effective work.

The Hand Atomizer.—The hand atomizer is the most simple kind of a sprayer. It consists of a small can or glass jar to which is attached a tube, into which fits a piston. This piston is attached to a handle and by working it back and forth the spray material is forced out on the plant. The atomizer is one of the cheapest kinds of sprayers and costs from fifty cents to one dollar. This sprayer is of value for the small garden.

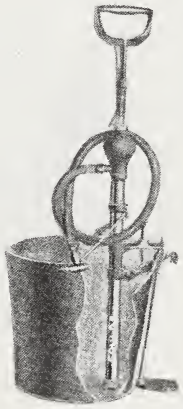


Fig. 41—Bucket sprayer

The Bucket Sprayer.—The bucket sprayer is a larger type than the atomizer, and does better work. It has a greater capacity and is easier to operate. This sprayer consists of a small pump, which usually has brass ball valves. The pump cylinder and air chamber is usually made of brass. A small piece of hose and a spray nozzle is attached to the pump. The pump is capable of developing considerable pressure and it is of value in spraying potatoes and many other larger plants. It can also be used for white-washing fences and small buildings.

The Knapsack Sprayer.—The knapsack sprayer is somewhat more convenient than either the atomizer or the bucket sprayer, especially when considerable spraying is done. It consists of a small tank cylinder, which is reinforced with stout

material of some kind. Into this cylinder fits a brass pump, which is about two inches in diameter. This insures rapid pumping and a constant high air pressure. A piece of stout hose and a spray nozzle, and sometimes an extension rod, are attached to the cylinder. This sprayer is valuable because compressed air is held in the cylinder and spraying can be done for some time between pumping operations. It can be strapped on the back or held under the arm. The capacity of such a sprayer is about four gallons, and it is excellent for

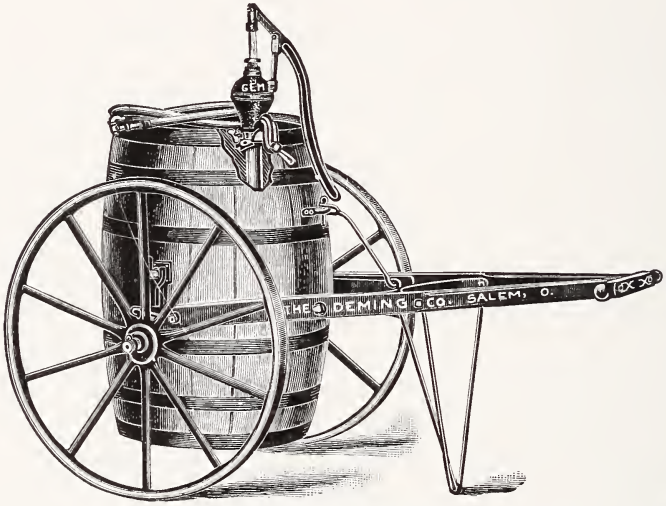


Fig. 42—Barrel sprayer

spraying potatoes as well as other small woody plants. For all general purposes, and for an all around good sprayer of medium price for the garden and the home, this one is to be preferred.

The Barrel Sprayer.—This sprayer is the largest of the hand machines. Its chief value is the greater capacity and ease of operation. The barrel sprayer is used for larger areas and is also valuable for fruit trees and shrubbery. It requires two persons to operate it.

REVIEW QUESTIONS

1. Name two classes of pests found on cultivated plants.
2. How can a disease and an insect injury be detected?
3. What two classes of insects injure plants?
4. How should biting insects, sucking insects, and plant diseases be controlled?
5. Give the formula for mixing arsenate of lead.
6. Where should hellebore be used?
7. Give the formula for mixing Paris green.
8. Describe the method of making carbolic acid emulsion.
9. On what class of insects is the common soap mixture used?
10. Describe the making of kerosene emulsion.
11. How is tobacco decoction made?
12. What is the best spray for plant diseases?
13. Describe the making of Bordeaux mixture.
14. What two remedies are used for treating potato diseases?
15. Give the formula for corrosive sublimate and formalin.
16. Describe the hand atomizer, the bucket sprayer, and the knapsack sprayer.

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CHAPTER VIII

VEGETABLES GROWN FOR THEIR ROOTS

The root crops include some of our most important vegetables. These plants are grown for their enlarged roots. They are very important as food products, and all of them are easy to grow.

The general requirements for each crop are about the same. All of the root crops need a light, porous soil. A sandy loam is the best, because this kind of a soil allows the root to grow large and smooth. In almost every case these vegetables do better in the early or the late part of the growing season, when the weather is cool and moist. The Jerusalem artichoke, beets, carrots, onions, parsnips, radishes, salsify, sweet potatoes, and turnips are some of the root crops. The Irish potato is also grown in the ground and is called a root crop, altho the Irish potato is not a root, but an enlarged stem which grows under the ground.

Artichoke (Jerusalem)

Jerusalem artichoke is a tall plant that belongs to the sunflower family. It is grown for its tubers. The tubers are either gathered in the fall or in the spring, and are used the same as potatoes. The tuber is considered equal in value to that of the potato, and it can be used either for human food or for stock food. The Jerusalem artichoke will thrive on poor land. It is easier to cultivate and is more productive than the potato. The plants will grow in any soil, but a sandy loam gives the highest yield.

The artichoke is propagated by planting the tubers. If the tubers are small they should be planted whole, but if large tubers are available they should be cut into pieces containing two eyes. Plant the tubers as soon as the ground can be worked in the spring. The tubers should be planted two or

three inches deep, in rows three or four feet apart, and fifteen to eighteen inches apart in the row.

The soil should be cultivated during the early growth of the plant. In a short time the tops will shade the ground and no cultivation will be necessary. Cut off all of the flowers as soon as they appear. The crop should be given at least five months in which to mature its tubers.

The tubers can either be dug in the fall, as soon as the tops are dead, or be allowed to remain in the soil and dug in the spring. If they are dug in the fall they must be placed in sand and stored in a cool, dark cellar.

Beet

The beet is grown either for its root, or for its tops, which are used for greens. The beet is rather hardy and of easy culture. The beets are divided into two classes, according to the color and the shape of the root. The garden beets are mostly red or mottled in appearance, while the sugar beets are usually yellow. The roots are either roundish or cone-shaped. The round or turnip-shaped beets require a short season for their growth, while the half-long, cone-shaped types must have the whole season to properly develop.

The soil for the beet should be rich, sandy, and loose, so that a smooth, regular root can develop.

The beet is usually planted in drills or rows from twelve to eighteen inches apart and the seed from one to two inches apart in the rows. When the plants are four or five inches high, they should be thinned to stand three or four inches apart in the rows. Later a second thinning should be given if necessary. If the seed has been sown in the hotbed, the plants should be transplanted four or five inches apart in the rows. Sow the seed to a depth of one inch in the early spring and one and one-half inches later in the season. Beet seed should be sown early, and as soon in the spring as the ground can be worked. The beet requires from forty to seventy-five days to mature, according to the variety. Three or four later

sowings can be made at intervals of two or three weeks. Thoro cultivation is advisable, and a dust mulch should be kept on the ground.

Carrot

The carrot is grown and cultivated for its root. The short-rooted varieties of carrots are becoming more popular, and

Fig. 43—Three types of the garden beet

should be grown in every garden. The carrot is hardy to frost and can be planted early in the spring.

The soil should be a rich, sandy loam of good tilth. Deep spading of the ground is important, if smooth, uniform roots are grown. Baking of the soil should be avoided, because it

not only injures the growth of the roots, but produces poor quality in the vegetable.

The seed should be sown to a depth of one inch, or a little less. They can be planted as soon as the ground can be worked in the spring, and successive sowing can be made every month until July. The earlier, short-rooted types

Fig. 44—Four types of the carrot; the short types are usually grown for early use and the longer types for winter

should be selected for successive sowing. If the large half-long varieties are grown, plant the seed about the first of May. The seed should be planted in rows from twelve to eighteen inches apart, and from one to two inches apart in the rows. As soon as the plants are well up, thin them out to stand two or three inches apart. The larger varieties can be thinned a second time to stand five or six inches apart. Cultivate the soil thoroly and frequently, and do not permit any crusts to

form on the surface. The carrots require from forty to seventy-five days in which to mature, according to the variety.

The carrot can be stored in sand in a cool, rather moist room in the cellar and be used all winter. The long season carrots are the best to store, and they should be gathered late in the fall.

Onion

The onion is one of our most important vegetables. It is grown for its bulbs, which are eaten either raw or cooked. The bulbs are also used for flavoring. Onions are grown either from seed, or from small bulbs called sets. The onion is very hardy, and is a cold season crop. It is usually one of the first

Fig. 45—The tops of onion seedlings removed preparatory to transplanting

crops that are planted in the garden. The onion does the best in the cooler part of the growing season, and consequently it should be planted as early as possible in the spring. In mild climates the onion can be planted in the fall and remain in the ground all winter, if a little protection is given to the bulbs. The onion seed is very slow to germinate, and for that reason the seed bed must be very carefully prepared. Good surface tillage is important, because the seedlings are easily killed by weeds.

A muck or a peat is perhaps the ideal soil for the onion. Rarely ever is this type of soil available in a garden. However, onions lend themselves very well to a variety of soils and produce profitable crops. They should be grown in every

garden. Since the onion should be planted early in the spring, fall plowing of the soil is recommended. Well-rotted manure should be worked into the soil, but rarely ever is it advisable to use fresh manure.

If green onions are desired, sets should be planted. Sets are immature bulbs, which have been grown from seed and their development and growth retarded by being thickly planted. The sets should be planted early to a depth of one or one and one-half inches. They should be placed about two inches apart in the rows, and the rows twelve inches apart. As soon as the young onions are large enough to use, they should be pulled and eaten raw. Green onions are sometimes raised from seed, but they are later and require more care and attention.

Fig. 46—A bunch of green onions properly prepared for market

Large onions can be produced either from sets or from seed. Better onions are secured by planting the seed, and allowing the free development of the bulb. To grow large bulbs, carefully prepare the seed bed, and sow the seed from one-half to one inch deep, as early as the ground can be worked. The seed should be sown rather thinly in the rows, and the rows spaced from twelve to fifteen inches apart. As soon as the plants come up, they should be thinned to stand four or five inches apart in the rows. Better and earlier onions can be raised if the seed is sown in the hotbed in February or March. The seed should be sown thickly in the rows and the rows two

inches apart in the hotbed, as described on page 47. When the seedlings are four or five inches tall, transplant them to the garden, setting the plants four or five inches apart in the rows, and the rows twelve to fifteen inches apart. It requires from sixty to one hundred and thirty days to mature the crop, according to the variety.

The onion should be given constant and thoro cultivation. Usually some hand weeding is necessary, and it should be done before the weeds get large. Hand weeding should be done at the time of thinning. Watch carefully to see that the soil does

Fig. 47—The relative size of onions grown by three different methods
a, from sets; b, from transplanted seedlings; c, from seed

not bake over the seed, because the seedlings are small and weak, and they will not be able to push thru the ground.

The harvesting of the onions is done when the tops begin to die. The tops first turn yellow, and later brown, and gradually fall down. If a few of the tops are still green when the greater per cent of them are turning yellow, break down all the green tops, so that the crop will ripen up evenly. If the whole crop remains green well into September, all of the tops must be broken down, to make the plants ripen. When the tops are dead, pull the onions, placing them in shallow rows to dry out in the sun and wind. Less danger from rain is experienced if the onions are cured under some cover after

they have dried for a couple of days in the sun. As soon as the onions are dried, the tops are cut off an inch from the bulb. The onions should then be stored for winter use.

The storage of the bulbs can be done either in boxes or in barrels. Strive to place them in a frost proof room that is cool, and where there is a good circulation of air. The onions should be graded before they are packed and stored. Remove all of the small ones and save them to plant early in the spring for green onions.

The onion smut is the most troublesome disease. If rotation is practiced and the plants sprayed with Bordeaux mixture when they are small, some relief can be had. Destroy all affected plants.

The root maggot is the most serious insect pest. Spray the young plants with carbolic acid emulsion as soon as they are up, and at weekly intervals for four or five weeks.

The onion thrips, which is a very small insect, sometimes attacks the leaves and does great damage. Spraying the plants with kerosene emulsion will kill this insect.

Potato

The potato is one of our most important vegetables, and one that is used in every home. Whenever the term potato is used, it is usually understood to mean the Irish potato. This plant is grown for its enlarged underground stems. The enlarged stem is called a tuber. The potato requires some care and attention to grow it successfully. The seed potatoes should be good, and preferably grown in the north.

The potato is grown either as an early crop or as a late crop. Earliness is due to the variety as well as to the time of planting. If a quick-maturing variety is selected and the seed planted early, the tubers will get ripe sooner. If a late variety is selected, even tho the seed is planted early it will take longer for the tubers to mature.

The soil for the potato should be a good sandy loam. It should be spaded deeply, be well drained, and be moderately rich. If the potato is planted on a heavy soil, the tubers

cannot grow large, because the soil will be too compact. Many times there is too much moisture on heavy soil for the proper development of the tuber. The soil must not be manured the same year the potatoes are grown, because it will cause a disease, known as the potato scab, to grow on the

Fig. 48—A poor and a good seed piece of the potato

tubers. This disease makes the tubers rough and produces deep holes in the skin. When manure is applied to the land, it should be spread on the soil a year or two before the potatoes are planted, so that it will be well-rotted and incorporated with the soil.

Commercial fertilizer gives good results in the growing of the potato. Special potato fertilizers are on the market, and can easily be purchased. The fertilizer should be applied at the rate of five or six pounds to one hundred square feet, either broadcast or by distributing it along the rows. It should be thoroly mixed with the soil before planting the seed. Always plant the potato on soil that is free from the potato scab, and do not plant potatoes on the same ground year after year.

The seed of the potato is the tuber. Medium-sized and uniform tubers should be selected for seed. A tuber affected with the scab, or the rot, should not be planted, because the

potatoes will become diseased. It is usually too expensive to plant whole potatoes; consequently the tubers are cut into several pieces. Each seed piece must have at least one eye or bud, and two buds are better. There must also be some stored food for each bud, so that it will get a good start. The seed piece should be about the size of a hen's egg and should weigh about three ounces. Smaller seed pieces are sometimes planted, but they are not considered so good.

Fig. 49—The growth from a good and a poor seed piece. Note the difference in the vigor of the sprouts

The seed pieces should be planted from nine to fifteen inches apart in the row, and the rows from twenty-four to thirty inches apart. The richer the soil, the closer together the seed pieces can be planted. If horse cultivation is to be given, the rows should be spaced about three feet apart. The stronger growing varieties must also be planted farther apart than the weaker kinds. The potato should rarely ever be planted less than four inches deep. In heavy clay soils three inches is permissible. If the tubers are planted too shallow the potatoes will sunburn. The late crop should be planted a little deeper than the early crop. The potato requires a cool season, and should be planted as early as the ground can be worked. It takes from one hundred to one hundred and thirty days to mature this crop. All seed potatoes should be treated, as described under diseases, before they are planted.

The soil should be cultivated by harrowing or raking once

or twice before the potatoes come up. This holds the moisture and also kills the little weeds that start to grow. As soon as the plants appear above the ground, cultivate the soil more deeply. As the plants get larger, the cultivations should become more shallow. Level culture of the potato is superior to that of hilling. The soil should be kept in a good physical condition and from six to ten cultivations are usually necessary.

The potato is marketed at various times. The tubers for the early crop are dug as soon as they are large enough to use. The early potatoes must be handled very carefully, to prevent bruising of the tuber. They should be dug as needed, because they soon wilt and become poor in quality, if they are allowed to remain out of the soil very long before they are ripe.

The late crop of potatoes should not be dug until all of the vines are dead. Careful digging is necessary and the spading fork is better to dig them with than the hoe. After the potatoes have dried, they should be stored in a cool, frost-proof cellar. The tubers should never be exposed to the sun very long.

There are several serious diseases common on the potato. The scab, the rot, and the rhizoctonia are diseases that are found on the tuber. If the scab is present, the seed should be soaked in a solution of formalin at the rate of one-half pint to fifteen gallons of water for two hours before the tubers are cut. If rhizoctonia is found on the tubers, they should be soaked in a solution of bichloride of mercury, at the rate of one ounce to eight gallons of water for two hours. All potatoes that are black, discolored, or rotten should be thrown out and not planted. The tubers used for seed should never be planted until they have been treated with one or the other of the above solutions.

The potato is also subject to the attack of leaf blights. These diseases affect the leaves and the stems of the plant, and cause them to die. Spraying the plants with 4-4-50 Bordeaux mixture will aid in keeping these diseases under control. The spraying should begin soon after the plants are above the ground, and continued every ten days or two weeks thru the season.

The most injurious insect is the potato beetle, or the potato bug. This insect is known to all potato growers and is found in every part of the country where potatoes are raised. The most common remedy for this pest is to spray the vines with Paris green at the rate of one ounce to eight gallons of water, or arsenate of lead at the rate of one pound to ten gallons of water. Add one pound of stone lime to the poison, to prevent the burning of the foliage. Apply this spray whenever the bugs appear.

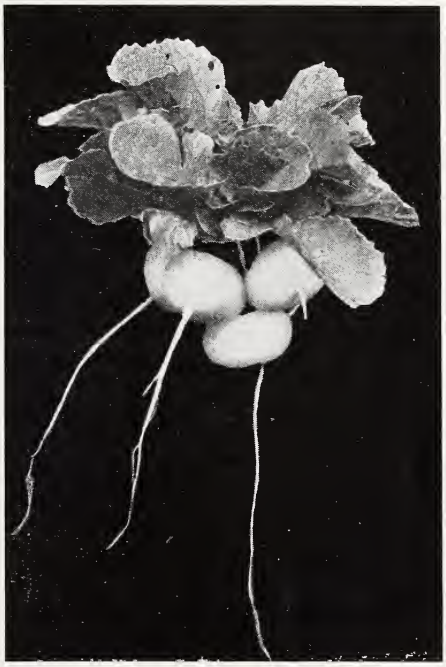

Fig. 50—Radishes properly bunched for the market

Radish

The radish is one of the most popular root crops. It is grown for its roots, which are eaten raw. The radish is hardy to frost, and it does the best in the cool part of the season. The radish is divided into spring, summer, and winter varieties. The spring types grow very rapidly, and are small in size. The summer varieties are larger than the spring types, and grow more slowly and stay in good condition for a much longer period of time. The winter varieties are grown similarly to beets and can be stored in soil in the cellar for use during the winter. The shape of the radish varies from spherical to half-long and long, and the color ranges thru reds, yellows, grays, black and white.

The soil for the radish should be light, warm, and quick. Sandy loams of good tilth grow the best quality of radishes. For the early spring crop of radishes the soil need be spaded only four or five inches deep, but for the summer and the winter varieties the soil should be spaded eight or ten inches deep. The soil in the seed bed should be pulverized and made very fine, so that smooth, uniform roots will develop.

The seed should be sown to a depth of one-half inch in the spring and one inch later in the summer. The seed of the spring varieties can be sown in the garden as soon as the ground can be worked, and every ten days until the middle of June. About the middle of August seed can be sown again for a fall crop. If hotbeds are available, radishes can be grown up to about Christmas time, by carefully managing the beds. Only one crop of the summer and the winter varieties is grown, and the seed is usually sown in May or June. The spring radish seeds can be sown one-half inch apart in the rows, and the rows six or eight inches apart. When the seedlings come up, they should be thinned to stand about two or three inches apart in the rows. For the summer and the winter radishes the seeds must be sown farther apart, according to the variety. These varieties are usually sown from one to two inches apart, and later the seedlings are thinned to stand five or six inches apart in the rows. The rows should be twelve to fifteen inches apart. It requires from eighteen to seventy days to grow radishes, according to whether they are the spring, summer, or winter varieties.

Cultivate the soil as soon as the radishes come up. Keep a dust mulch on the surface. Thin the plants when the first cultivation is given.

The radishes should be picked as soon as they are large enough. The early sorts become pithy in a short time after they mature and are of no value.

Parsnip

The parsnip is grown from seed. The large, thick, fleshy roots are used in soups and for stews. The parsnip is a long-

season crop, and occupies the ground from early in the spring until late in the fall. It is hardy to frost, and the roots are thought to be improved if they are subjected to slight freezing. This point, however, is denied by some authorities. Parsnips require a deep, well-prepared seed bed. The ground should be made very fine, and it should not be manured the same year the crop is to be grown.

The soil for the parsnip should be a loose, sandy loam. A heavy soil does not grow good roots, because it offers too much resistance to their rapid development. The soil must be spaded deeply, and all stones and trash must be removed, because such rubbish produces irregular and gnarly roots.

The seed should be sown to a depth of one-half to one inch, and one or one and one-half inches apart in the rows. The rows should be from eighteen to twenty-four inches apart. When the seedlings come up they must be thinned out to stand from three to five inches apart in the rows. Only good, fresh seed should be planted, because they lose their power of germination after the first year.

Cultivate the soil frequently. See that a dust mulch is constantly on the surface.

Dig the roots in the early fall, as needed. Later in the season they can be either taken up and stored in sand in the cellar for winter use, or allowed to remain in the ground and used the following spring.

The parsnip is comparatively free from insects and from diseases.

Rutabaga

The rutabaga is sometimes called Swedish turnip. It is grown for its roots, and is used sparingly for the table. It has a richer flesh than the turnip, and requires a longer season to mature.

The soil requirements for this crop are about the same as those for the radish or the beet, and a rich, sandy loam is preferable, altho other types are used. All stones and trash should be removed and the ground spaded eight to ten inches deep.

Sow the seed as early in the spring as the soil can be worked, and every three or four weeks until June. Plant the seed to a depth of one or one and one-half inches, in rows twelve inches apart. Space the seeds one inch apart in the rows and when the plants are up thin them to stand four to six inches apart in the rows. It requires from eighty to ninety days to mature the crop. Cultivate frequently, and keep a dust

Fig. 51—A children's market early in the season. Note the root crops

mulch on the surface of the soil. Harvest the crop after frost comes, and store the roots in sand in a cool cellar.

Salsify

The salsify is grown for its root. It is also called oyster plant, because the flavor of the root somewhat resembles that of an oyster. This vegetable requires a long growing season, and the seed should be sown early in the spring. It is hardy to frost. The roots can be left in the ground all winter, the same as the parsnip.

The soil for the salsify should be similar to that for any of the other root crops. A deep, sandy loam, free from stones and trash, is the best. Deep spading is essential.

The seed should be sown to a depth of one and one-half inches in rows that are twelve inches apart. Sow the seed

any time before May. Place the seeds an inch or two apart in the rows, and after the plants come up, thin them to stand four or five inches apart in the rows. It requires from ninety to one hundred and ten days before the roots are edible. The roots may be used as soon as they are large enough, or they can be dug and stored in sand or soil, and placed in the

Fig. 52—Five different types of sweet potatoes

cellar for winter use. The roots can also remain in the soil over winter, and be harvested in the spring.

Sweet Potato

The sweet potato is grown for its enlarged roots. The plant is tender to frost, and requires a long season in which to mature. The plants are started from slips grown from the roots, which are placed in a mild hotbed. The sprouts which grow from the roots are then set in the field after danger of frost is past.

The soil should be loose, rich, and warm up quickly. It should be spaded eight or ten inches deep. All lumps should

be broken up. Well-rotted manure worked into the soil will give excellent results.

It is rarely ever advisable for the amateur to attempt to grow his own plants, because they are rather difficult to produce. The sweet potato plants or slips, as they are sometimes called, should be set eighteen inches apart in the rows, and the rows three to four feet apart. The slips should be set a little deeper than they were in the seed bed. They should be laid horizontally, and most of the plant covered, except the tip. Press the soil firmly about the roots and water the plants after they are transplanted. The sweet potato is grown either on a ridge or on the level. In regions where there is plenty of rainfall, the ridges are to be preferred, but where the rainfall is light, level culture gives good results. Cultivate the plants regularly until the vines cover the ground.

The sweet potatoes should be dug as soon as the vines are touched with frost. A heavy frost will injure the potatoes, so they must never be frozen. After digging, allow the sweet potatoes to dry in the sun for a day, and then pack the roots in dry sand and place them in a warm, dry room. Wrapping each potato in paper and packing them in a box or a barrel will also give good results. In digging the roots, handle them with great care. Never cut or bruise the potatoes, because they are very susceptible to rot, and any injury will cause them to decay.

There are several diseases and insects which are sometimes troublesome. The practice of rotation will aid in combating some of the diseases. The leaf troubles can be controlled by spraying with Bordeaux mixture. The eating insects can be controlled by spraying the plants with arsenate of lead or Paris green.

Turnip

The turnip is grown for its root and is planted either as an early spring or as a late fall crop. Early sowing of the seed for the spring crop is necessary if good roots are desired. The turnip will not do well in heat, and it shouldnot be grown in the hot part of the summer.

The soil should be light, cool, and rich. It should be spaded eight or ten inches deep and made very fine. Remove all stones and trash and cultivate frequently.

The seed should be sown one-half to one inch deep. The rows should be spaced twelve inches apart, and the seed sown one inch apart in the rows. After the plants are up, thin them out to stand three or four inches apart in the rows.

Cultivate the soil frequently and keep a dust mulch on the surface. Pull the roots when they are large enough to use. If a fall crop is grown, the turnips can be dug before the ground freezes, packed in soil, and stored in a cool cellar.

Rotate the crop from year to year to aid in combating the insects and diseases.

REVIEW QUESTIONS

1. Why is it necessary to thin the young beet plants?
2. Describe the proper way to store carrots.
3. How does the onion differ from the other root crops?
4. Carefully examine a beet, carrot, onion, and potato and describe the differences between them.
5. How many ways can large onions be grown?
6. What kind of soil produces the best onions?
7. How does the storage of the onion differ from that of the beet and the carrot?
8. Why is the potato such an important crop?
9. What is meant by early and late potatoes?
10. Why should early potatoes be dug only as needed?
11. Name the three kinds of radishes which are grown.
12. Why is it important that radishes be gathered as soon as they are mature?
13. Why is salsify called oyster plant?
14. How does the salsify differ from the parsnip?
15. How can the parsnip be kept over winter?
16. How does the sweet potato differ from the Irish potato?
17. Is the sweet potato a root or an enlarged stem?
18. Why should the turnip be grown either early or late in the season?

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CHAPTER IX

VEGETABLES GROWN FOR THEIR GREEN PARTS

Many vegetables are grown for their leaves, and a few for their stems and their flowers. The greater number in this class is grown for their green leaves, but the broccoli and the cauliflower are grown for their modified flower parts, while the kohl-rabi is grown for its enlarged juicy stem.

The highest quality in these vegetables is produced by growing them rapidly and giving them plenty of water. Since the leafy part of any plant consists largely of water, it is important that the water be supplied uniformly and abundantly, in order to get the largest growth.

The requirements for the plants in this group are varied, and no general recommendations can be given for the group as a whole.

The uses of the plants are also varied. Some of them are used for salads, others for garnishing, while still others are enjoyed as relishes. However, these vegetables are very important and comprise many of our most profitable crops.

Broccoli

The broccoli is grown for its modified flower parts. It closely resembles the cauliflower, except that the heads are smaller, are more tender to heat, and are not as fine flavored.

The seed should be sown in a hotbed and the plants set out in the garden about the first of May. The plants are the proper size to transplant when they are from four to six inches high.

The soil should be rich, moist, and spaded deeply. If the soil is poor, work compost into it, and mulch the ground around the plants with manure, to hold the moisture. The plants should stand from eighteen to twenty-four inches apart in the rows, and the rows two feet apart. Cultivate the soil frequently to conserve the soil moisture. Watering

the plants will aid greatly in producing superior quality. As soon as the head begins to form, tie the leaves over the head. This protects the head from the sun and allows it to bleach out white. The crop should be harvested when the heads are about four inches in diameter, because the quality of the broccoli is better at this time.

The broccoli is attacked by the same insects and diseases as the cabbage. The same treatment which is recommended for the cabbage will control the troubles on the broccoli.

Brussels Sprouts

The Brussels sprouts belong to the same family as the cabbage. It is perhaps the most delicate plant of the cabbage family. The edible part of the plant is the small sprouts or buds. The plant first grows a leafy stalk upon which the sprouts appear in the axils of the leaves toward the end of the summer. After the sprouts are about one-half grown, the lower leaves of the plant should be removed to allow the sprouts to develop. Frost improves the quality of the sprouts and some plants should be grown so as to mature in September and October.

The soil should be a rich loam. Deep spading of the ground gives the best crop. The soil moisture should be held by mulching the ground. The watering of the plants will greatly increase the yield.

If early plants are desired, sow the seed in the hotbed and grow the plants as recommended on page 43. For the late crop sow the seed in the open, and treat plants the same as recommended for the growing of the early plants. The seed for the late crop should be sown in May and June and the seedlings transplanted in July and August. The plants should be set from eighteen to twenty-four inches apart in the row, and the rows from twenty-four to thirty inches apart, according to the variety. Keep the soil well cultivated and have a mulch on the ground to conserve the moisture. Pick the sprouts when they are about one or one and one-half inches in diameter. Cutting off the sprouts rather than breaking them off is recommended.

The same insects and diseases that attack the cabbage are found on Brussels sprouts. Apply the same remedies as recommended for the cabbage.

Cabbage

The cabbage is one of the most important and most widely grown vegetables in America. It is cultivated for its more or less dense head. The cabbage head varies in shape from a pointed, rather cone-shaped head, to the round and flattened head. There are many varieties of each type.

Two crops of cabbage are usually grown in every locality. The first crop is the early cabbage, and the plants are started in the hotbed. The second crop is the late cabbage, and the

Fig. 53—Three types of cabbage: a, early; b, medium; c, late

seed is usually sown in the open. The plants for the late cabbage should be grown and handled in the same way as the plants for the early cabbage.

The soil should be deep, rich, well-drained, and in good physical condition. Large amounts of well-rotted manure should be applied to the land. If new land is available, cabbage will do exceptionally well on it. The plants should be set from eighteen to twenty-four inches apart in the rows, and the rows from twenty-four to thirty inches apart, according to the variety. The seed should be sown from thirty to forty days before the plants are to be set in the field. It requires from seventy to one hundred and twenty days to

mature cabbage, according to the variety. The seed for the early cabbage is usually sown in February and March. The seed for the late cabbage is sown in May and June. The plants should be transplanted to the garden when they are from four to six inches high.

The general culture of the cabbage consists in keeping the plants growing rapidly, by maintaining plenty of moisture in the soil. See that a dust mulch is present. The watering of the plants will aid them greatly to develop crisp, tender heads.

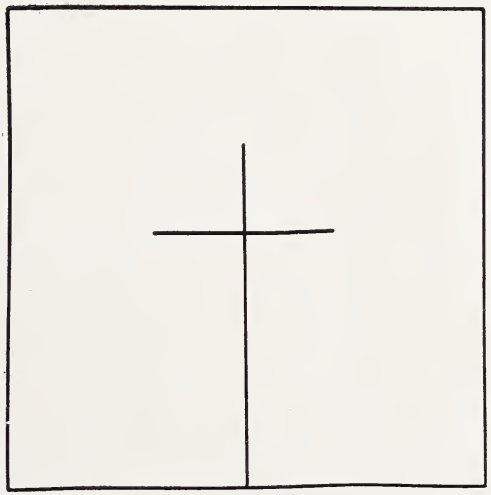

Fig. 54—Tarred paper disk used to protect a cabbage plant from the cabbage maggot

The late cabbage should be grown and stored for winter use. The Danish Ball Head is excellent for storing. If the crop is to be stored the cabbage should be pulled up late in the fall with all the leaves on the head. Do not shake the earth from the roots. Dig a trench in a well-drained place, tuck the outside leaves around each head, and turn the head down in the bottom of the trench, leaving the roots sticking up in the air. Now place two or three rows of cabbage in the trench and cover the heads and roots with soil. As the weather gets colder, add more soil to the pile and later cover it with straw or manure, to prevent the freezing of the heads.

There are several diseases found on the cabbage and the related plants. The clubroot and the black rot are the most serious. Avoid the attack of diseases by keeping the plants growing rapidly. Never allow the plants to become stunted

in growth. Destroy all sick plants as soon as they appear. Add air-slaked lime at the rate of one bushel to 500 square feet of soil. Destroy all weeds, rotate the crops, and burn all infected plants. Select manure free from diseased leaves.

The insects of the cabbage are serious, but they are easily controlled if the proper methods are used. The cabbage worms do a great amount of damage every year. Spraying or dusting the plants with Paris green, arsenate of lead, hellebore, and pyrethrum is effective in killing the cabbage worms. The dusting of the plants is perhaps the most satisfactory for the garden. This should be done in the morning, when the dew is on the plants, so that the powder will stick to the leaves. Add one part of the poison to ten or fifteen parts of air-slaked lime or flour, and dust the plants thoroly. Use the Paris green or the arsenate of lead only when the plants are young, and before they begin to head. If the worms are troublesome after the heads begin to form, use pyrethrum or hellebore, at the rate of one ounce to one gallon of water, or mix one part of the poison with four or five times its volume of flour or air-slaked lime. Pyrethrum or hellebore must be strictly fresh, or it is of no value. See that the vessel in which these poisons are kept is tightly closed. A novel way of dusting the poison on the plant is to make a sack of thin cloth, place the materials in it, and shake the sack over the plant.

The cutworms sometimes eat the plants off at the surface of the ground. The best remedy for this pest is to dig around the plant that is cut off and locate the grayish-brown worm just under the soil, which can be easily killed.

The plant lice are sometimes troublesome, especially on the plants in the hotbed. Spray the plants with Black Leaf 40, using one part to eight or nine hundred parts of water. This remedy is effective against all plant lice.

The root maggot is often troublesome and injurious to the plants of the cabbage family. These insects attack the root and the stem of the plant near the surface of the soil. Place small tarred paper disks about each plant, or spray them thoroly with carbolic acid emulsion, made by boiling one-

fourth of a pound of hard soap in one quart of water and adding one-fourth of a pint of crude carbolic acid. Churn the mixture until it is a creamy mass. Use this as a stock solution and dilute one part of the carbolic acid emulsion with thirty parts of water, and thoroly spray the stem and the soil about the plant.

Chinese Cabbage

The Chinese cabbage belongs to the cabbage family. It is grown for its head of loose leaves, which resembles a head of Cos lettuce. It is usually boiled and used as a pot herb. Chinese cabbage gives the best results when it is grown as a fall vegetable, because it does not grow well in hot weather.

The seed should be sown in July or the early part of August to a depth of one-half inch, and the seedlings transplanted and handled in the same way as the cabbage. Occasionally the seed is sown where the plants are to stand in the garden and later thinned out to the proper distance. Either method will give good results, if the plants are grown carefully.

Any good garden soil will grow Chinese cabbage. However, a cool, moist soil with plenty of organic matter in it is preferable.

The plants should be set twelve to fifteen inches apart in the rows, and the rows eighteen inches apart. Cultivate the soil frequently and follow the same general methods as you would for the growing of cabbage. Keep the plants growing rapidly and water them when necessary, in order to produce crisp, tender leaves.

Cauliflower

The cauliflower belongs to the cabbage family. It is grown for its modified flower part, which is the edible portion. The cauliflower is rather hard to grow, and is very exacting as to climate, soil, cultivation, pests, and many other conditions. The cauliflower does not do well in a hot, dry climate, but rather prefers a cool, moist atmosphere.

The plants for the early crop should be started in the hot-

bed during March, and should be grown carefully. The seed for the plants of the second crop is sown out of doors in a seed bed, about May or June. The late crop of seedlings is grown in the same way as the early crop.

The soil should be made especially fertile by spading plenty of compost into it, and it should be well-drained. An abundance of moisture is necessary. Irrigation is sometimes profitable. The cauliflower prefers a sandy loam soil of good tilth, but it will grow very successfully on soil of different types. Deep spading and plenty of organic matter in the soil increases the yield and improves the quality of this vegetable.

The plants should be set from eighteen to twenty-four inches apart in the rows, and the rows from twenty-four to thirty inches apart, according to the variety. Firm the soil well about the roots of the plant and water them thoroly when they are set in the garden. In the evening or on a cloudy day is a good time to transplant the plants. The seedlings are ready to transplant when they are four to six inches high. The cauliflower is rather tender, and the plants for the early crop should not be set in the garden until danger of severe freezing is over. It requires from ninety to one hundred and thirty days for the cauliflower to mature, according to the variety.

When the head appears, tie the outside leaves over the head, so that it will be white and of good quality. Harvest the crop when the heads are full grown.

The same insects and diseases that attack the cabbage are injurious to the cauliflower. Use the same remedies as recommended for the cabbage.

Celery

The celery is grown for its blanched leaf stalks. It is either eaten raw as a relish or creamed. It is excellent in either case and every garden should grow celery. Every owner of a home garden should raise his own plants to insure good quality and to save exposure in transportation.

There are usually two crops of celery grown, the early and the late. The plants for the early crop should be started in

the hotbed, as recommended on page 45. The seed for the late crop should be sown out of doors about the first of May. The plants for the late crop should be grown and treated in the same way as the plants for the early crop.

The celery prefers a well-drained soil. A muck soil produces exceptionally good celery, altho the plants will grow on a variety of soils. The ground should be spaded deeply, be rich, moist, and in a good physical condition. Commercially, celery is often grown on bottom land, which insures moisture, and the plants grow very large. However, upland celery is considered to be finer in quality.

The celery plants should be set about six inches apart in the rows. The distance between the rows varies, according to the method of blanching, and ranges from two and one-half to five or six feet apart. Celery can be planted either in a shallow trench, or on the level. When setting the plants in the garden, firm the soil well about the roots. Water and shade the plants for a couple of days, until they become established. It requires from one hundred and ten to one hundred and fifty days from the time the seed is sown until the plants mature, according to the variety.

The celery must be blanched before it is used. There are several methods of blanching in common practice. One good method is to place a twelve-inch board on either side of the row. This method is commonly used for the early crop. The boards should lean slightly inward toward the tops of the plants, and they should be set when the plants are dry. It requires from two to four weeks to blanch the celery.

The best method of blanching the late crop is to hill up the plants with earth, which should be done only when they are dry. The hilling up of the plants should begin when they are four or five inches high. Be careful to see that the soil does not get into the heart of the plants, because this will injure their growth. The celery should be hilled up at frequent intervals during the growth of the plants, to secure the best quality. When the celery is hilled up with soil, the rows must be spaced farther apart and the usual distance is from four to five feet.

The new celery culture, a system recently developed, is a method in which the plants are set in beds, and spaced six inches apart each way. As soon as the plants grow four or five inches high, boards are placed around the edges of the bed. which blanches the outer rows. The light is partly shut out by the boards, and since the plants are growing so close together, they also exclude some light and consequently blanch themselves by their own shade. The self-blanching varieties are selected for this method of culture.

The celery can be stored in the open ground until the weather gets too cold, and later it can be placed in the cellar for winter use. When storing the celery in a cellar the plants should be packed in sand or soil and kept cool, in order to prevent them from decaying.

The leaf blight is the most serious disease of the celery. This trouble often attacks the plant in the seed bed. By spraying with the standard 4-4-50 Bordeaux mixture the leaf blight can be overcome. The spraying must begin when the plants are in the seed bed, and be continued at intervals of two or three weeks until the crop is ready for blanching.

Chard

The chard is used for greens, similarly to spinach. It is a variety of the beet and is grown in much the same way. The chard is not as popular as it should be, but its popularity is increasing and every garden should have some chard growing in it. The chard is easily grown and matures quickly.

The soil should be moderately rich, and should contain plenty of organic matter. The chard is a heavy feeder and too much plant food cannot be supplied.

The seed should be sown as early in the spring as the ground can be worked, and every three or four weeks until July, if a succession is desired. Sow the seed to a depth of about one inch. Plant in rows and place the seeds about one inch apart, and the rows twelve to eighteen inches apart. When the plants have reached a height of two or three inches, thin them out to stand three or four inches apart in the rows. As the plants increase in size, a second thinning should be

given, so they will stand from six to eight inches apart. The plants which are pulled out during the thinning can be used for greens. As the plants grow and the leaves get larger, the leafstalks are pulled and used separately from the leaves.

Endive

The endive is a salad plant. It is a short-season crop and can follow lettuce in the hot months, and will give a salad plant almost continuously thru the summer. It is eaten either as greens or as a salad. If the endive is used as a salad, the plants must be blanched by tying up the heads and excluding the light. The endive is hardy to frost and it may be sown either early or late. It is the most popular as a fall salad plant. It can often follow early potatoes, early cabbage, early corn, as well as several other early vegetables. There are two common varieties, the curled and the broad leaf types. The curled varieties are the best in quality.

Fig. 55—An endive plant tied for blanching

The endive does well on a variety of soils. However, a quick, sandy loam gives the best results. Plenty of organic matter and a liberal supply of water will grow good endive on almost any soil.

The seed can be sown either in the hotbed or in the open. If early plants are desired, sow the seed one-fourth of an inch deep in the hotbed in March. Transplant the seedlings one inch apart each way and treat them the same as lettuce.

When the plants are two inches high, transplant them to the garden, setting them twelve inches apart in the rows, and the rows fifteen to eighteen inches apart. Fall grown plants are perhaps the most valuable. For the fall crop, sow the seed during the last of July or the first of August. Either transplant the seedlings or thin the plants out where they stand and treat them the same as the spring crop. From

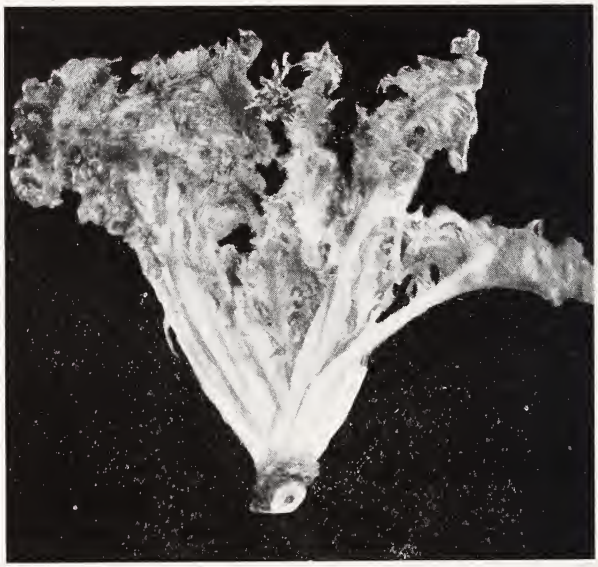

Fig. 56—An endive plant blanched and ready for use

thirty-five to forty-five days are required to mature the plants. The fall grown plants should be blanched for winter use. This is done by excluding the light from the plant. They may be covered up with boards or flowerpots, or the leaves pulled together and tied. The drawing of the leaves around the plants and the hilling up of dirt about them in the same manner as for celery is sometimes satisfactory. It requires from ten to twenty days to blanch the leaves.

The endive may be taken up and stored for winter use in a cool, dry cellar. The plants should be lifted when the soil is a little dry, so that some dirt will adhere to the roots. After the plants are placed in storage they should be kept from the light, so they will slowly blanch. As soon as the endive is blanched it should be used, or it will rot.

Kale

The kale belongs to the cabbage family. It is a plant that does not form a head, but is grown for its leaves. The different varieties of kale have leaves of several colors. They are usually curled and quite ornamental. The leaves are often used for garnishing. Kale is grown either as a spring or as a fall crop.

The kale prefers a soil similar to that of cabbage. It will grow well on many soils, if there is plenty of organic matter present and a liberal supply of water. A quick soil gives the best quality.

The plants will not stand transplanting very well. For this reason, the seed should be sown where the plants are to grow. Sow the seed from one-half to three-quarters of an inch deep. The seed for the spring crop can be sown in either April or May, and for the fall crop in August. It requires from fifty to sixty days to mature the kale. The plants should be thinned out to stand five or six inches apart in the rows, and the rows twelve to eighteen inches apart.

The leaves should be picked as they are needed. They are usually considered to be better in quality after they have been touched with frost, and for that reason the fall grown crop is the more popular. Kale can often follow the earlier crops after they have been harvested.

The diseases and the insects which attack the kale are the same as those which infest the cabbage. Apply the same remedies as recommended for the cabbage.

Kohl-Rabi

The kohl-rabi is sometimes called turnip-rooted cabbage. It belongs to the same group of plants as the kale and the cabbage. The edible part of the plant is the enlarged stem just above the ground. It is eaten when the stem is about three inches in diameter, and before it is full grown. It is

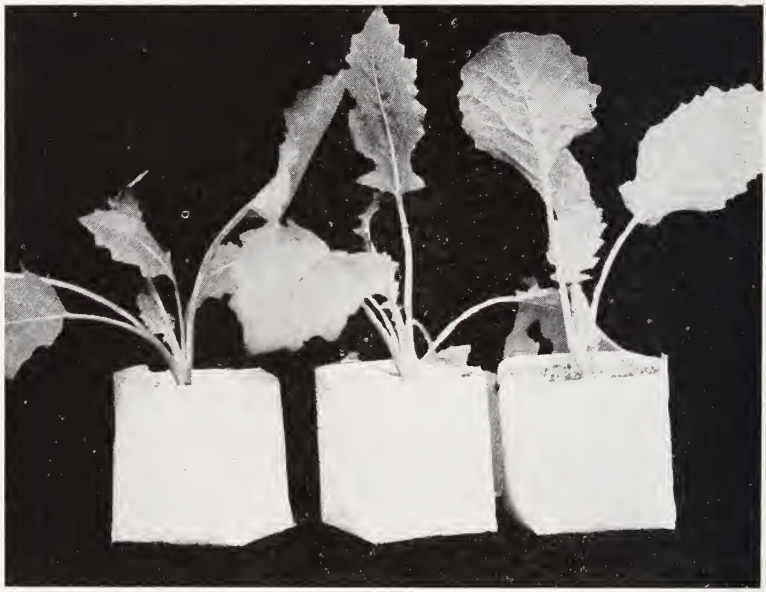

Fig. 57—Kohl-rabi plants started in paper pots

hardy to frost. There are two kinds of kohl-rabi, the white and the red.

The plants require a rich, strong soil. A soil adapted to the growing of cabbage will grow good kohl-rabi. Liberal feeding and plenty of moisture is necessary for large yields.

The seed for early plants can be sown in the hotbed, but the better method is to sow them in the open, where the plants are to stand. The seed should be sown to a depth of

one-half to one inch, as soon as the ground can be worked in the spring. The plants should be thinned to stand six or eight inches in the rows, and the rows fifteen to eighteen inches apart. Successive sowings can be made every two weeks until the first of August. It requires from fifty-five to sixty-five days to grow the crop, according to the variety.

The soil should be cultivated frequently and a dust mulch kept on the surface. Plenty of water is necessary to produce a good crop.

The enlarged stems are called knobs. These should be gathered before they are full grown. If the knobs are allowed to mature they become tough and woody.

The insects and diseases are the same as those of the cabbage. The same remedies recommended for the cabbage will hold these troubles in check.

Lettuce

The lettuce is our most important salad plant. It is grown for its leaves, and is almost always eaten uncooked. It is a

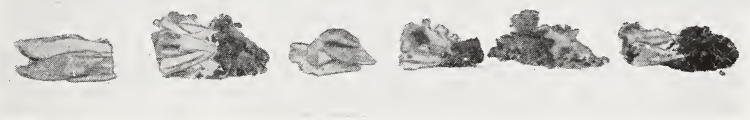

Fig. 58—The tops of lettuce plants removed for transplanting

quick growing plant and a short-season crop. Lettuce is often used as a succession or a companion crop, or to follow or accompany other crops. It is hardy and can be grown early in the season, before many other more tender vegetables are planted. It is very susceptible to heat, and it should not be grown during the hot part of the summer, but should be grown as an early spring or a late fall crop.

There are three well-marked types of lettuce: (1) Loose head lettuce, (2) solid head lettuce, and (3) Cos lettuce. The loose head and the solid head types are the most popular and

are grown to the greatest extent. The Cos lettuce is grown in some sections, but only to a limited degree. The lettuce also varies in color and shape of head. Some types have plain green leaves, varying in shade from a light to a dark green, while other varieties have green leaves which are spotted with red or brownish spots. The green leaved sorts and the curly types are the most popular and are used for garnishing as well

Fig. 59—A well-developed plant of leaf lettuce

as for salad. Lettuce is also divided according to the color of the seed into the white and the black-seeded varieties.

This salad plant is found on the market every month of the year, and it can easily be grown to maturity in the hotbed, either very early in the spring or later in the fall. The lettuce transplants well, and where good heads are desired the seedlings must be transplanted once or twice. Transplanted seedlings produce large heads of good quality.

The soil for the lettuce should be well-drained and fertile. The plant food should be readily available. A sandy loam soil is preferable, but good plants can be grown on a variety of soils. Plenty of organic matter and nitrogen are essential for rapid growth, which in turn produces crisp, tender leaves.

Fig. 60—A good specimen of head lettuce

The seed for the early crop should be sown in rows in the hotbed and the seedlings transplanted about one inch apart in the cold frame. When the seedlings are two or three inches tall, cut off part of the leaves and set the plants in the garden six to twelve inches apart in the rows, and the rows twelve to fifteen inches apart. The loose headed varieties can be

planted closer together than the solid head types. If a hotbed is not available, the seed can be sown in the garden as soon as the ground can be worked in the spring. Better heads will be secured if the plants are handled in the same way as when they are grown in the cold frame. A fall crop can be grown by planting the seed in August or early September, and allowing the plants to mature during the cool weather in the fall in a cold frame. Lettuce requires from thirty-five to fifty days to mature, according to the variety.

Frequent cultivations are necessary and a good dust mulch should always be kept on the surface of the soil. Use care when cultivating and see that the soil is not thrown into the head.

The crop should be picked when it is needed. Cutting the entire head is preferable to removing a few of the leaves. Harvesting should be done early in the morning, when the plants are crisp and tender.

The lettuce is remarkably free from insects and diseases, if it is handled properly. Occasionally damping off fungus attacks the seedlings in the hotbed and causes them to rot off at the surface of the ground. If this disease is noticed, withhold the water supply, remove the sash, and give the plants plenty of fresh air. Pull up and destroy all diseased plants. Spraying is of no value.

Mustard

The mustard belongs to the cabbage family, and it is grown as a salad plant or a pot herb. It is a cold season crop and should be planted either early in the spring or late in the fall. This plant must not be allowed to go to seed, because if it does it often becomes a serious pest in the form of a weed.

Any good garden soil will grow mustard. A sandy loam is preferable, and plenty of available plant food with a liberal supply of water will make the plants grow rapidly and produce large, succulent leaves.

The seed should be sown to a depth of one-half inch. The seeds are sown from one-half to one inch apart in the rows, and the rows vary from ten to eighteen inches apart. Usually the seed is sown in rows, but occasionally it is broadcast. After the plants are up, they should be thinned to stand from four to eight inches in the rows. The seed can be planted as early in the spring as the ground can be worked. If a fall crop is desired sow the seed in August. It requires from thirty to forty days to mature the mustard.

Harvest the plants when needed and use only the young leaves. In some of the large varieties, however, the whole plant is used in much the same way as a head of lettuce.

The insects and the diseases are usually never very serious.

Parsley

The parsley is an important plant, used for garnishing and for seasoning. The seed is slow to germinate, and the seedlings are delicate and they must be handled carefully. The parsley continues to produce fine leaves until it flowers, after which its value is lost.

The soil should be a light sandy loam of good tilth, altho the plant will do well on almost any rich soil. Plenty of humus and an abundance of water will give a better quality of leaves

The seed can be started either in a window box, in a hotbed, or in the open. If planted in the hotbed, sow the seed in March or April. Plant the seed one-half inch deep and in rows two inches apart. After the seedlings have grown their third or fourth leaf, transplant them to the garden six to eight inches in the rows, and the rows twelve inches apart. The seed can be sown out of doors after the soil warms up. Sow them thinly in rows twelve inches apart. After the plants are well established, thin out the weaker ones, so that the remaining plants will stand six or eight inches apart in the rows. Cultivate the plants thoroly and keep all weeds pulled out from among them.

The leaves should not be picked until after the plants are

well established, which requires about three months. Only a few of the leaves should be removed at a time. Always cut the large, matured leaves and never take the young, immature ones.

In the fall the plants can be potted up and grown in the window all winter, and they will furnish a fresh supply of leaves for seasoning.

This plant is seldom affected by any insects or diseases.

Spinach

The spinach is a plant grown for its leaves, which are used for greens. It is a short-season, cool-weather crop, and it should not be grown in the middle of the summer. It is sensitive to heat and should be planted either early in the spring or in the fall. The spinach is very hardy to frost, and it can be grown successfully in cold frames.

The soil for spinach should be quick, and a light, sandy loam is preferred. If heavy applications of well-rotted manure are worked into the soil, and nitrate of soda spread on the ground just as the plants are coming up, excellent results are secured.

Sow the seeds an inch or so apart in the rows, and the rows twelve inches apart. After the plants are up, thin them out to stand from four to six inches apart in the rows. Sow the seed to a depth of one inch. The seed should be sown in the garden as early in the spring as the ground can be worked and every two weeks until the first of June, if a succession is desired. Early in the fall, seed can be sown for a fall crop.

Cultivate the soil at least once a week. Maintain a dust mulch on the ground and keep the plants growing rapidly.

Harvest the crop by picking the leaves as needed. If the plants show any tendency to go to seed, cut the whole plant. Usually two or three pickings are received from each sowing.

Occasionally several diseases are found on this plant. Whenever any diseased plants are found, they should be destroyed. Rotate the crop, and less trouble is experienced with disease.

REVIEW QUESTIONS

1. What part of broccoli is used for food?
2. Describe Brussels sprouts and tell how they are used.
3. What is the difference between the early and late cabbage?
4. What kind of soil is best suited to the growing of cabbage?
5. Describe the best method of storing cabbage for home use.
6. How does Chinese cabbage differ from the ordinary cabbage?
7. What is meant by blanching celery?
8. Describe a good way of storing celery for home use.
9. Why is it necessary to blanch celery before using it?
10. How does the chard differ from the beet?
11. How is endive used and what is the best time of the year to plant it?
12. Why is it necessary to blanch endive?
13. Describe kale and tell how it is used.
14. Describe kohl-rabi and tell what part is the edible portion.
15. Why is the lettuce such an important salad crop?
16. Describe the three kinds of lettuce we can grow.
17. Why should lettuce be harvested early in the morning?
18. What is the chief use for parsley?
19. How is spinach used?
20. What is the best kind of soil for spinach?

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CHAPTER X

VEGETABLES GROWN FOR THEIR FRUIT AND SEED

This group of vegetables includes the bean, corn, cucumber, eggplant, muskmelon, okra, pea, peanut, pepper, squash, tomato, and watermelon.

With the exception of the pea, all of these vegetables are tender plants, and they must not be planted until danger of frost is over. The greater number of these plants, with the exception of the pea and the bush kidney bean, are long-season crops, and occupy the ground the entire season.

The soil should be well prepared, and thoro and deep cultivation is essential, especially during the early growth of the plants. As the season advances, shallow cultivation is better.

These vegetables are grown for their fruit and seed. The fruit from some of these vegetables is eaten raw, while that of others must be cooked before it is edible.

Bean

The bean is divided into the kidney and the Lima groups. Bush and pole types are found in both the kidney and the Lima beans. The bush types are beans that grow small and do not vine, while the pole types have a long vine and must be given poles, or strings, to twine around. The kidney beans are either eaten green and then are called string beans, snap beans, or green beans, or they are dried and shelled, and then they are used for soup or baked beans. The bush beans are usually grown in the garden for green beans, because they can be produced in the shortest length of time. The Lima and the pole beans require a longer period in which to mature. All of the beans are tender, and they must not be planted until all danger of frost is passed. The Lima beans are more tender to

frost than the kidney beans, and they are usually planted a little later. In certain sections of the North the season is too short to grow Lima beans, because they require a long season in which to mature.

The soil for the bean varies, according to the different types. The Limas require the lightest soil, but as a rule the kidney beans will grow and produce a profitable crop on a great variety of soils.

There are many varieties of beans in each class. Each variety has some merit within itself, and the variety best suited to individual taste should be selected.

Kidney Bean.—The kidney bean includes our common bush, pole, and field beans. Some of these have edible pods and some do not. The dwarf or bush beans are earlier, hardier, and require no training. They mature in a short time. The pole beans are more susceptible to frost, require supports, and must be planted later than the bush beans. The pole types require a longer season to mature than the bush types. The bush types should be sown in rows from twelve to eighteen inches apart, and the beans two or three inches apart in the rows. The pole types should be planted either in hills three feet apart each way, with three or four beans in a hill, or in rows four feet apart and the beans six or eight inches apart in the rows.

The seed should be planted two or three inches deep, and about the first week in May, or after danger of frost is over. The ground should be cultivated thoroly and a dust mulch kept constantly on the surface of the soil. The cultivation should be done in the afternoon or the evening. The bush beans mature in from thirty to forty-five days, while the pole beans require from forty to seventy-five days, depending upon the variety. The beans should be picked while they are young and tender, and clean picking will lengthen the time of bearing. String beans can be eaten green, canned, or pickled.

The bush bean can be grown before some other crop, and it is also used to follow certain crops. It can be grown either in the spring or in the fall. Many crops will follow beans

very nicely; and when planting bush beans in the early spring the plan should be to follow them with some other crop.

Lima Bean.—The Lima beans are also divided into bush and pole types. They are again subdivided into the true Lima, which is especially tender to frost and requires a long season; the potato Lima, which is not so late and slightly more hardy than the true Lima; and the small Lima, which is earlier, more hardy, and more resistant to drouth than the other two types. The small Lima is usually a heavy yielder, and is the best Lima for the northern states.

The soil for the Lima bean should be manured the previous year, and it should be light and warm. The bush Lima should be planted three to five inches apart in the rows, and the rows eighteen to twenty-four inches apart. Pole Limas should be planted either in hills four feet apart, with three or four plants in a hill, or in rows four feet apart and the plants eight to ten inches apart in the rows. It is always advisable to plant more seed than is necessary to insure a good stand. After the plants are up, they should be thinned out to the proper number. The seed should be planted two or three inches deep, with the eye down. The bush Limas require from fifty to sixty days to mature, while the pole Limas require somewhat longer time, according to the variety.

Corn (Sweet)

The sweet corn is a popular vegetable. It is very easy to grow and is of great importance as a market garden crop. The sweet corn is often called sugar corn, because of the sugar it contains. It is a tender vegetable, and must not be planted until danger of frost is over. The corn requires a warm, quick soil for its rapid development. The ear should be picked when the kernels are plump and well filled and it should not be removed from the stalk until almost time to cook it, because when the corn is allowed to stand several hours after being picked it loses a large percentage of its sweetness.

A sandy loam soil which will warm up quickly is a good soil for the sweet corn. A sunny exposure gives the best corn,

because it will not do well in the shade. The soil should be enriched by liberal applications of good manure.

The corn is grown either in hills or in drills. A greater number of ears can be produced if the corn is grown in drills. If the drill method is used, plant the seeds twelve to fifteen

Fig. 61—Four varieties of sweet corn

inches apart in the rows, and the rows from twenty-four to thirty inches apart, according to the height of the variety. Two or three seeds can be placed together, and when the corn is up thin out all but one good plant. If the hill method is used, plant the seeds twenty-four inches apart in the rows, placing four or five seeds in a hill. Later, thin the corn so that three good, strong plants are in each hill. The rows should be from twenty-four to thirty inches apart. The distance to plant is determined somewhat by the variety, and can be varied slightly from the above. As a rule, the early varieties

of corn are smaller plants, and can be planted closer together than the late varieties, which are larger and require a longer time in which to mature. The seed for the early corn should

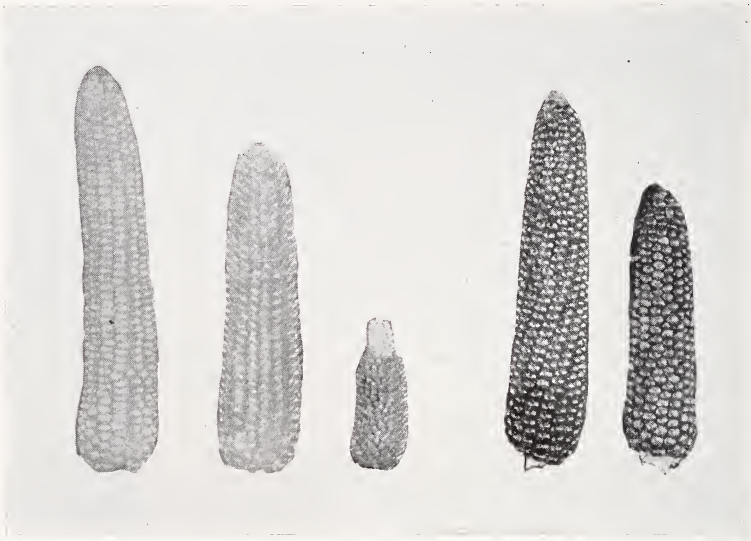

Fig. 62—Five varieties of pop-corn

be planted about one inch deep, and for the late crop one and one-half or two inches deep.

Cultivate frequently and keep a dust mulch constantly on the soil. Cultivating the soil once a week is none too often for good results.

The corn will mature in from fifty-five to one hundred days, according to the variety. By selecting the early maturing varieties, many times corn can follow some of the earlier crops, such as radishes, beans, beets, etc. The early varieties can be planted up to about the first of July and mature a crop.

The corn smut is the most troublesome disease. It is easily recognized by dark masses appearing on the tassels and on

the ears. Later these masses burst and discharge great volumes of black powder, which infest the other plants. All such infested parts should be taken off of the plant and burned as soon as they are found. Spraying is too expensive and is not very effective.

Numerous insects attack the corn plant, but no good remedies other than cultural treatment can be recommended. The cutworm often eats off the plants. Occasionally the stalk borers are troublesome, but the corn ear worm is perhaps the most injurious. Fall plowing and rotation will help to keep these insects in check.

Corn (Pop)

The pop-corn is very popular in the home garden. It is grown for its mature ears, and when they are dried the grains are popped by exposure to heat. Pop-corn is grown in the same way as the sweet corn, altho it can usually be planted a little closer together. It must be allowed to mature before it is gathered. It should then be dried by allowing it to lie in the sun and wind for a couple of weeks with the husks on the ears.

Cucumber

The cucumber is a vining plant. The fruits are picked while they are immature. They are used for salads and for pickling. The large specimens are called cucumbers and are used for slicing. The small fruits are called pickles and are canned, making either sour or sweet pickles. The cucumber is very tender to cold and it must not be planted until danger of frost is over. After the plants begin to set fruit, they must be picked regularly, or the vines will stop bearing. If the plants run to vines, the pinching off of the tips will often make them produce more fruit. There are many varieties of cucumbers. Certain varieties have been developed to produce long fruits for slicing, while other kinds produce small, short fruits for pickling.

The cucumber will grow well on a variety of soils. How-

ever, a sandy loam with plenty of organic matter in it is preferable. The soil should warm up quickly and be in good tilth. An ideal way of handling the cucumber is to place two or three shovelfuls of good decayed manure in every hill, or spread it along the row of cucumbers.

Fig. 63—A cucumber plant started in a flowerpot

The cucumber is planted in hills or in drills. If the hill method is used, plant eight to ten seeds in the hill and place the hills four or five feet apart. Each hill should cover a space varying from eighteen to twenty-four inches in diameter. When the plants are about six inches high, they should be thinned out to three or four plants in the hill. If the drill method is adopted, two or three seeds should be planted every twelve or fifteen inches in the rows, and the rows five or six feet apart. When the plants are about six inches high, thin them out to one plant in a place, with about twelve inches between the plants. The seed should be sown from three-fourths to one inch in depth. The cucumber can be sown in the garden from about the middle of May until the early part of July. The later sown seed will produce small pickles. It requires from fifty to eighty days for the cucumber to mature.

The soil should be cultivated until the vines cover the ground. All weeds should be pulled out by hand when cultivation stops.

There are several diseases which are troublesome. The downy mildew is perhaps one of the most serious. If the vines are sprayed every week or ten days with Bordeaux mixture, good results are usually secured. In fact, spraying with Bordeaux is an insurance against several other diseases, such as the anthracnose and the wilt. Rotation of crops should be practiced.

The insect pests are annoying. Chief among the insects is

the striped cucumber beetle. This is a little striped insect which makes its appearance about the time the cucumbers come up. Several remedies are effective, and one of the best means of control is to cover each hill with a wooden frame on which cheesecloth has been tacked. This frame should be set over the hill before the plants come up. It can be made by nailing together four boards, six or eight inches wide and twelve to fifteen inches long, and tacking cheesecloth over the top. The box should be left on the plants until the leaves touch the cloth. Dusting the ground before the plants come up with ten parts of air-slaked lime and one part of Paris green, and continuing to dust the plants at intervals of every seven or eight days with this material until they begin to vine, is also effective. Persistent treatment is necessary.

The cucumber plant louse is serious in many sections. These insects are usually found on the underside of the leaf and cause it to roll under and form a ball. As soon as the lice are found, lift up the vine and spray the plants thoroly, on both the under and the upper sides of the leaves, with Black Leaf 40, diluted one part to eight hundred parts of water.

Frequent and good cultivation, which keeps the plants growing rapidly, will aid greatly in combating the insects and the diseases. Rotate the crop and destroy all vines and rubbish every fall.

Eggplant

The eggplant is a very tender vegetable. It should be found in every garden, altho it is not grown commercially to any great extent, except in the South. It is cultivated for its large fruits, which are edible when they are two-thirds grown. The plants require great care, and they must not be checked in their growth. Pot culture of the eggplant until it is ready to set in the garden is preferred. The fruit of the eggplant is black, purple, or white. The purple and the black varieties must be grown for the market, but the white sorts are grown for the home.

The eggplant requires a well-drained, sandy loam soil. The soil should warm up quickly and be of good tilth. A shovelful of compost placed around each plant and worked into the soil gives excellent results.

The seed should be sown in the hotbed in March and the plants grown as described on page 46. They should not be set in the garden until after danger of frost is past. The last of May or the first of June is the safest time for out-of-door planting. The plants should be set twenty-four to thirty inches apart in the rows, and the rows from twenty-four to thirty-six inches apart, according to the variety. If the season is long, more room can be given to the plants. Constant and thoro cultivation is necessary. Keep a dust mulch on the surface of the soil to prevent evaporation. Larger and finer fruits can be raised if the buds and tips of the branches are pinched off after three or four fruits have set. It requires from one hundred and fifteen to one hundred and forty-five days from the time the seed is sown until the plants mature their fruits.

The leaf blight is the most serious disease. Destroy all affected plants and spray the remainder with Bordeaux mixture. Practice the rotation of crops.

The potato bug sometimes eats the foliage of the eggplant. Spray the plants with Paris green, using one ounce to five gallons of water, whenever eating insects are troublesome.

Muskmelon

The muskmelon is grown for its fruit. It is a warm season plant, and the seed must not be planted until danger of frost is past. There are two distinct classes, namely, the varieties which have a scaly and hard, furrowed rind, and those which have a softer and a netted rind. The latter varieties are better adapted for growing in the North, because they are shorter seasoned.

The muskmelons require a light, warm, sandy loam soil. Many other soils will grow melons, but they will not produce as good a quality. The soil should be well enriched by placing

a shovelful of compost in every hill. Watering the plants with liquid manure is also excellent.

The muskmelons are usually planted in hills. The distance between the hills varies, according to the soil and the variety. A good standard distance to plant the seed is five feet apart in the rows, and the rows five or six feet apart. Plant eight or ten seeds in a hill; and when the plants are crowding, thin out all but three or four of the largest plants. Cover the seed to a depth of three-fourths to one inch, and do not sow the seed until danger of frost is past. Out-of-door planting should be done during May and June, depending upon the locality. The muskmelons require from sixty to eighty-five days to mature.

Cultivate the soil frequently, until the vines cover the ground. Later pull out all weeds by hand.

If the tips of the vines are pinched off after they have grown two or three feet long, it will induce them to branch, which will cause a better distribution of the fruit.

The melons should be picked as soon as they are ripe. The degree of ripeness can be known by pressing the end of the melon with the finger and if soft, the proper degree of ripeness is reached. The fruit will easily separate from the stem by gently lifting it up, which also is another indication of its ripeness.

The insects and the diseases are practically the same as those of the cucumber. The same remedies that are recommended for the cucumber will usually apply for the muskmelon.

Okra

The okra is sometimes called gumbo. It is a hot weather plant and tender to frost. The okra is grown for its seed pods, which are picked when they are young and tender. The okra is used in soups and stews, and is sometimes canned or dried for winter use. The plants can be started in flowerpots in the hotbed, but better results are secured if the seed is planted directly in the open. The pods form rapidly and are

usually ready to harvest in a very short time after the blossom closes.

The soil should be a light sandy loam, altho the okra does well on several types of soil.

The plants are either started in the hotbed or planted in the open. If the plants are started in the hotbed, they should be set in the garden about the last of May or the early part of June. The seeds should be planted from one to one and one-half inches deep, when they are grown in the open. The okra is sown either in hills or in drills. When the seeds are sown in drills they should be planted four or five inches apart in the rows, and the rows f om two to four feet apart, according to the variety. After the plants are up and well established, thin them out to stand twelve to eighteen inches apart in the rows. The pot-grown plants should be set the same distance, namely, twelve to eighteen inches. If okra is planted in hills, the plants should be spaced about twenty-four inches each way and two or three plants in each hill. The okra requires from fifty to seventy days to mature.

Practice clean culture and keep a dust mulch on the ground. A top dressing of well-rotted manure is valuable, and causes the plants to grow rapidly.

The pods must be picked regularly. They are ready to gather from twenty-four to thirty-six hours after the blossom closes. If they are allowed to get large they become woody and unfit for use. The pods are used chiefly in soups and impart an excellent flavor to them.

Pea

The pea is a hardy short season vegetable and is somewhat tender to heat. Peas should be planted early in the spring and not grown in the middle of the summer. They are divided, according to the height to which the plants grow, into—dwarf peas, which have low growing vines; tall peas, which have tall growing vines that must be supported with brush or wire; and half dwarf peas, which have vines that are taller than the dwarf varieties and shorter than the tall varieties. The half

dwarf varieties occupy a position between the dwarf and the tall varieties. The dwarf peas are the earliest, while the tall peas are the latest to mature. The dwarf peas do not require any supports, but the half dwarf and tall varieties should be supported with chicken wire or with brush. Occasionally the pea is planted in double rows about six inches apart, and the support placed between the rows.

The soil for the pea does not have to be very rich. A light or sandy loam gives the best yields. Coarse manure should not be used on the ground just prior to planting. The peas do the best on land that has been mulched with manure the previous year.

The best quality of seed should be purchased. The seed should be sown from one to three inches deep on sandy soils. Early in the season and on clay soils the seed should not be planted so deep. The seeds should be spaced about one and one-half inches apart in the rows. If the double row method is used, the rows should be six to eight inches apart, and the double rows from eighteen to thirty-six inches apart, according to the variety. The dwarf peas can be planted the closest together, while the tall peas require the greatest distance. The seed should be sown as early as the ground can be worked in the spring.

The pea is one of the earliest vegetables which can be planted. The seed can be sown every ten days up until the middle of May. Successive sowings give a constant supply of green peas. The early maturing varieties can be sown again in August for a fall crop. After the plants are up and well established, thin them out to stand two or three inches apart in the rows. The pea requires from forty-five to eighty days to mature its crop, according to the variety.

The pea should be given shallow cultivation, so as not to injure the roots. If the vines grow too fast, the ends should be pinched off, which will force the plant to branch and consequently to produce more pods.

If the dwarf varieties are grown, no supports are necessary; but if the half dwarf or tall varieties are selected, supports

must be given. Brush stuck into the ground between the narrow rows, or chicken wire netting stretched between the two rows, makes an excellent support for the vines.

The pods should be picked as soon as they are filled out. If they are gathered regularly, the bearing season will be much longer than if they are allowed to become hard and dry.

There are several diseases which are sometimes injurious to the pea. The mildew is the most common one. The mildew can be detected by a white powdery material on the leaves. When the mildew is found, the plants should be dusted with flowers of sulfur or sprayed with Bordeaux mixture.

The pea louse is sometimes a troublesome insect. It is similar to the plant louse, which is common on the cabbage or the rose. The pea louse can be killed by spraying the vines with Black Leaf 40, using one part to eight hundred parts of water.

Peanut

The peanut is a plant grown for its seed. The peanut, after flowering, grows down into the ground and ripens the seed under the ground. If the flowers are unable to penetrate the soil, they soon die and no peanuts are formed. The plant is very tender to frost and the seed must not be planted until the weather is warm.

The soil for the peanut must be one that contains lime. If lime is not present, the plants will produce only shells without any kernels in them. The peanut gives the largest yield on a heavy soil, but the quality is poor and the pods are dark colored. A light sandy loam soil, to which lime has been added, gives a very good yield and produces the finest quality of nuts. One bushel of lime to every twelve hundred square feet of surface soil is about the proper amount. Well-rotted manure worked into the soil is valuable.

The peanut should be planted to a depth of three or four inches. The nuts should be spaced three to six inches apart in the rows, and the rows from eighteen to thirty inches

apart, according to the variety. When the plants are up, they should be thinned to stand from six to twelve inches apart in the rows. In the north the seed should be planted about the first of June. It is best to shell the seed before planting, and to be careful not to break the skin of the kernel.

Constant and thoro cultivation is necessary in order to keep the soil loose about the plants. All weeds should be pulled up and destroyed and a surface mulch preserved until the vines cover the ground. The peanuts should be dug before frost kills the vines. The nuts should be dried carefully and stored in a frost proof room. The nuts must be roasted before they are edible.

Pepper

The pepper is a warm season plant and grows until frost. The plant is cultivated for its fruit, which is used for seasoning, for pickling, and for mangoes or stuffed peppers. The sweet varieties bear fleshy fruits, which are mild and sweet in flavor and eaten as sweet peppers. The cayenne peppers bear fruit that is small, very hot and pungent, and is used for seasoning.

The pepper grows the best on light, sandy soil which is rich and contains plenty of humus. Deep spading and a liberal supply of water aids greatly in producing peppers of good quality.

Since the pepper is a long season plant, the seed should be sown in the hotbed and the plants handled as described on page 49. When the seedling plants have reached the proper size, and after all danger of frost is past, they should be set in the garden. The distance the plants should be set varies with the variety. For most of the varieties the plants should be set eighteen inches apart in the rows, and the rows two feet apart. The plants should be watered after they are transplanted, and the soil should be pressed firmly about the roots. In some sections, where the season is long, the seed can be sown in the open and the plants handled in the same way as previously described. The fruit will be ready to gather

from one hundred and ten days to one hundred and forty days after the seed is sown.

Clean cultivation gives the best results. A dust mulch should be kept on the ground to conserve the soil moisture.

If the plants are large and the fruits abundant, supports for the plants are necessary. A stake driven down close to each plant and the plant tied loosely to the stake gives satisfactory results.

The most troublesome disease is the anthracnose. It can be held in check by spraying with Bordeaux mixture.

The insects are usually never troublesome.

Squash

The squash is cultivated for its fruit. There are two kinds, the summer squash and the winter squash. Most of the summer squash are bush kinds, that grow more compact and do not have any vines. The winter squash all have long vines and are called running squash. All of the squash are tender to frost, and they must not be planted until danger of cold weather is past. The growing of squash is not usually difficult and it is very interesting.

The soil should be warm and of good tilth. It must be well-drained. One of the best ways of preparing the soil is to mix two or three shovelfuls of well-rotted compost in every hill. The compost should cover a space of twenty-four square inches. The soil should be spaded eight to ten inches deep, and a sandy loam is preferred, altho good results are obtained on a variety of soils.

The seed should be sown to a depth of one and one-half inches after danger of frost is past. The squash is usually grown in hills, and the distance the hills are spaced is determined largely by the variety. The summer varieties can be planted much closer than the winter varieties. For the bush varieties or summer squash, space the hills from three to five feet apart in the rows, and the rows the same distance apart. For the vine or winter squash space the hills six feet apart in the rows, and the rows seven or eight feet apart. Plant

six or eight seeds in a hill; and when the plants are well established, thin out all but three or four of the strongest plants.

The soil should be cultivated until the vines cover the ground. After three or four good fruits have set, pinch off the ends of the vines and pull off the buds as they form. This treatment will give larger and better fruits.

The summer squash should be harvested before they are ripe, but the winter squash should not be harvested until they are mature. The fruit of the winter varieties should not be frosted. The stem of the squash should never be broken off, but allowed to remain attached to the fruit and become dry. The fruits should be stored in a cool, dry place, where they will not freeze.

The diseases and the insects that attack the squash are practically the same as those of the cucumber. The same remedies as recommended for the cucumber should be used.

Tomato

The tomato is one of our most popular vegetables. It is grown for its fruit, and every garden should have tomatoes. The tomato is one of the most extensively grown commercial crops, and lends itself to many ways of consumption. It is a warm season plant and cannot be set in the garden until danger of frost is past. Success in the growing of this crop depends upon securing good, stalky plants. The plants are easy to grow and each gardener can grow his own, if he is willing to give them good care. The plants should be grown as described on page 51. Since the tomato is a long season crop, the plants should be started in the hotbed or in a window box, especially if early fruits are wanted.

There are many varieties of tomatoes. They are classified as early, medium, and late varieties. As a rule, the early tomatoes are neither such vigorous growers, nor as heavy yielders as the late sorts.

Fig. 64—Tomato plant pruned to a single stem and supported with a stake

The tomato will do well on a great variety of soils. For early fruit a sandy soil that warms up quickly is the best. A soil of good tilth and a liberal amount of water produces excellent fruit. The tomato does the best on ground that has been manured the previous year. If active manures are applied the same year, the plant has the tendency to go to vine and not produce much fruit.

The plants for the garden should either be raised as described previously or purchased from a gardener. The distance the plants are set in the garden depends upon the variety and the method of training. If the plants are neither pruned nor trained, they must be set four feet apart each way. If they are pruned and staked, two feet apart each way is plenty of space. It is recommended that all plants grown in the garden be pruned and staked, because this method produces early fruit of better quality.

The plants are grown in the following ways: (1) Pruned and trained to one stem, (2) pruned and trained to two stems, (3) pruned and trained to three stems, (4) neither pruned nor trained but allowed to grow at will. For the garden, one of the first three methods should be used. Pruning to one stem means that all of the side branches that come between the leaves and the stem are cut off, leaving only one main branch

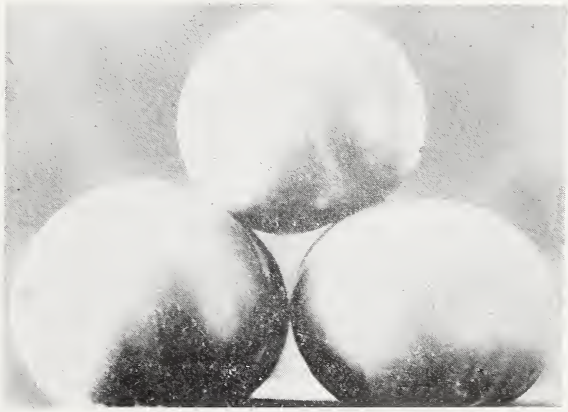

Fig. 65—A good type of tomato

to grow. Pruning to two stems means that two branches are allowed to grow and all side branches that start between the leaves and the stems are cut off. Pruning to three stems means that three branches are allowed to grow and all side shoots are pinched off. More room must be given to those plants that are pruned to three stems, and they are usually planted three feet apart in the rows, and the rows two feet apart. The plants that are neither pruned nor staked are allowed to grow at will, and have no branches removed. The tomato plants should be staked as soon as they are set in the garden, and the side branches should be removed as soon as they appear. The plants should be tied to the supports as they grow. A soft cord or a strip of muslin should be used to tie the plant to the stake.

The fruit should be picked as soon as it is mature, and should not be allowed to become overripe. If the fruit is to be sold, it should be graded and packed into uniform packages. Select fruit of one size for each package,—do not put large and small fruit in the same package.

There are several diseases troublesome in many sections of the country. The leaf blight is serious and some treatment

Fig. 66—A field of tomatoes pruned to a single stem and supported with stakes

must often be given for this disease. This disease first attacks the lower leaves and gradually works up the plant until all of the leaves are affected, and the plant dies. Spraying the plants with Bordeaux mixture as soon as they are set in the garden, and continuing every two or three weeks until late in the season, not only increases the yield of fruit but controls the leaf spot. Several rots are also common and they are held in check by destroying all affected fruits and spraying with Bordeaux mixture.

The insect pests are rarely ever troublesome. The large tomatoe worm is sometimes found, and the worms should be hand picked.

Watermelon

The watermelon is grown for its fruit. The plant is a vine and requires considerable space for its best development. It is a long-season crop and is grown the most extensively in the South. Rotation of crops must be practiced if good fruits are to be grown.

The soil should be a rich sandy loam, of good tilth, and well-drained. It should not have too much of nitrogen, because the plants will all go to vine.

The seed is usually sown in hills and the soil in each hill should be prepared as described for the cucumber. The seed should be planted about one inch deep and from six to eight in a hill. The hills should be spaced from six to eight feet, and the rows eight to ten feet apart, according to the variety. After the plants are up, they should be thinned to three or four plants in a hill. If the varieties are vigorous growers, the plants can be thinned again, leaving two in a hill.

Fig. 67—Pruning and training his tomato plants

The soil should be cultivated frequently until the plants

begin to vine, and later all weeds should be pulled out by hand.

The melons should be picked when they are ripe. A ripe melon can usually be determined by turning it over and examining the white spot where it rests on the ground. When the spot begins to turn yellow and becomes rough, the fruit is considered in the proper stage to harvest.

The insect pests are about the same as those of the cucumber and the muskmelon, and the same treatment is recommended.

REVIEW QUESTIONS

1. Name the vegetables grown for their fruit or seed.
2. What two kinds of beans are commonly grown?
3. What is the difference between a bush and a pole bean?
4. How do Lima beans differ from kidney beans?
5. Why should sweet corn be cooked as soon as it is pulled?
6. How does sweet corn differ from pop-corn?
7. Describe the growth of the cucumber plant.
8. Why does the cucumber need so much room?
9. Why is it necessary to rotate cucumbers with some other crop?
10. Discuss the growth of the eggplant.
11. When should the seed of the eggplant be sown and how should the young plants be treated?
12. What test is used in determining when muskmelons are ripe?
13. Describe the okra plant and tell how the fruit is used.
14. Name the three kinds of peas that are grown, and describe each.
15. Describe the peanut and tell how it grows?
16. Describe the two kinds of peppers.
17. What is the difference between the summer and the winter squash?
18. Name the four ways of growing the tomato.
20. Why is it valuable to prune and train a tomato plant?

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CHAPTER XI

PERENNIAL VEGETABLES

The perennial vegetables constitute a class of plants that occupy the ground for more than one year. This group includes two of our most profitable crops, the asparagus and the rhubarb.

The vegetables of this group require very little work, and when they are once planted they produce for a number of years. However, more care is necessary in preparing the ground before these crops are planted. The preparation of the soil is extremely important, because after the crop is planted it occupies the ground for a long time. It is impossible to cultivate or plow soil in which perennial vegetables are growing, and in this respect they are much different from other plants. It is necessary, therefore, to apply surface dressings of manure to the soil every year, so that the fertility of the land can be maintained.

The uses of these vegetables are varied. The edible portion is also different for each crop. The flower buds of the artichoke, the tender tips of the asparagus, and the leaf stems of the rhubarb are some of the edible portions.

Artichoke (Globe)

The globe artichoke is a plant that grows for several years after it is planted. It has dense whorls of large leaves, covered with fine hair, which gives it a woolly appearance. If the plants are started early in the hotbed, the large flower buds which are the edible parts, will develop the first season. However, if the plants are not started in the hotbed, it will require two years for them to produce a crop. The buds should be gathered before they approach the blossom stage. If they are allowed to remain on the plant too long, they become tough and unfit for use. The globe artichoke is not hardy north of the latitude of South Carolina. In other regions it

must be covered up with straw or manure during the winter to prevent winterkilling.

The globe artichoke will grow the best on a warm, sandy loam soil. The seedlings should be transplanted from the hotbed to the garden two or two and one-half feet apart in the rows, and the rows three or four feet apart. The plants should not be set in the garden until all danger of frost is over.

The plants should be well cultivated and no weeds should be allowed to grow around them. The large foliage of the plant requires an abundance of water, and watering will be found to give excellent results.

If the seeds are sown out of doors they should be planted in hills, where the plants are to stand. Plant four or five seeds in a hill and place the hills two or two and one-half feet apart in the rows, and the rows three or four feet apart. Thin to one plant in a hill. In the fall cut off the tops of the plant and cover the roots with manure or straw for the winter. In the spring remove the covering, and when the shoots start to grow, cut off all but three or four of the best ones, leaving these to make the year's crop without crowding. Renew the bed every three or four years.

Asparagus

The asparagus is one of the longest lived vegetables grown. Beds are known to be fifty years old and still profitable, altho in a commercial way a bed is usually renewed every twelve or fifteen years. Earlier and better asparagus can be grown if the plants are started in the hotbed and the seedlings transplanted to the garden. Occasionally the seed is sown directly in a permanent bed, and the plants thinned to the proper distance. If the seed is sown in a hotbed, the seedlings should be transplanted from the seed bed to their permanent location as soon as the weather permits. The setting of the plants must be done carefully. The plants should be set two feet apart in the rows, and the rows never closer than three feet apart. If room is available the plants can be

given more space. Deep planting gives the best results, and the crowns should be set six to eight inches in depth.

The asparagus will do well on many soils, but a sandy loam usually gives the best plants. The ground should be thoroly prepared and well-rotted manure mixed with the soil.

After the seedlings are planted, keep the ground from baking by cultivating it frequently. Feed the plants well and keep them free from pests. On the approach of fall cut off and burn the stalks. The burning of the old stalks aids in keeping down insects and diseases. After the stalks are removed, cover the bed to a depth of six or seven inches with fresh horse manure. Do not cover the rows as deeply as the space between them. Heavy feeding on the row has a tendency to cause the crowns of the plants to draw near the surface, and this should be avoided. When the bed is two or three years old, apply the manure just after the cutting season. The following spring, thoroly work the manure into the ground about the roots.

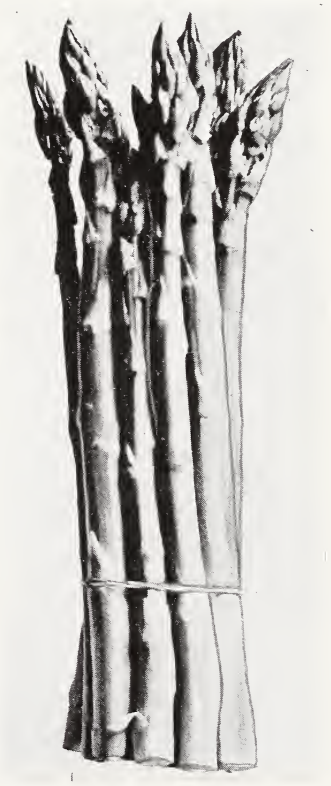


Fig. 68—A bunch of asparagus ready for the market

Chemical fertilizers should supplement horse manure. A complete chemical fertilizer containing about four per cent nitrogen, eight per cent phosphoric acid, and ten per cent potash is considered good. If nitrate of soda alone is applied to the plants in April, the season's crop will be greatly benefited, if there is enough rain to carry the plant food to the roots.

The two common diseases of the asparagus are the anthracnose and the rust. The plants should be kept growing vigorously by feeding, to offset the ravages of these diseases. Frequent cultivations are also beneficial and are now considered a promising remedy. The cultivation of the soil should be done every week or ten days. The burning of the tops in the fall also reduces the loss caused by these troubles. Spraying with a 4-4-50 Bordeaux mixture is valuable. When the plants are thoroly sprayed and given good cultural treatment, the anthracnose and the rust will not be as serious as when the plants are neglected.

The two asparagus beetles are the most destructive insect enemies. These insects can be controlled by spraying the plants with one-fourth of a pound of arsenate of lead to three gallons of water, beginning after the cutting season. Trap plants should be allowed to grow up early in the spring and these plants sprayed during the cutting season. The early spraying of the trap plants reduces the damage.

The asparagus can be used green, dried, or canned. The shoots must be cut while they are young and tender. The cutting should be done when the shoots are from six to eight inches high.

Rhubarb

The rhubarb or pieplant, as it is sometimes called, is grown for its leafstalks, which are used for sauce, pies, and wine. It is grown either by planting the seeds or by buying the roots, which are cut apart and planted. The rhubarb should be grown in every home garden, and six to ten plants will supply the ordinary family if the plants are well cultivated. The liberal feeding of the rhubarb will give excellent results.

The rhubarb lends itself well to forcing in the winter. If the roots are dug up after they have been frozen and are placed in a dark cellar and given water, they will produce large leafstalks in a short time.

The soil should be rich and deep. If the plants are to be grown early, the soil should warm up quickly in the spring.

Before the roots are planted, prepare the soil thoroly to a depth of eighteen inches. Well-rotted manure should be thoroly worked into the soil around the roots. If the seed is planted instead of the roots, the soil should be thoroly prepared. It must be fine and free from stones and rubbish. The seeds should be sown one or two inches apart in the rows, and one and one-half inches deep. When the plants are well established they should be thinned out to stand five or six inches apart. The rows should be twelve inches apart. The following spring, select the large, healthy roots and transplant them to their permanent place. The rows should be two to three feet apart, and the plants two feet apart in the rows. Spring planting of the roots usual y gives the best results.

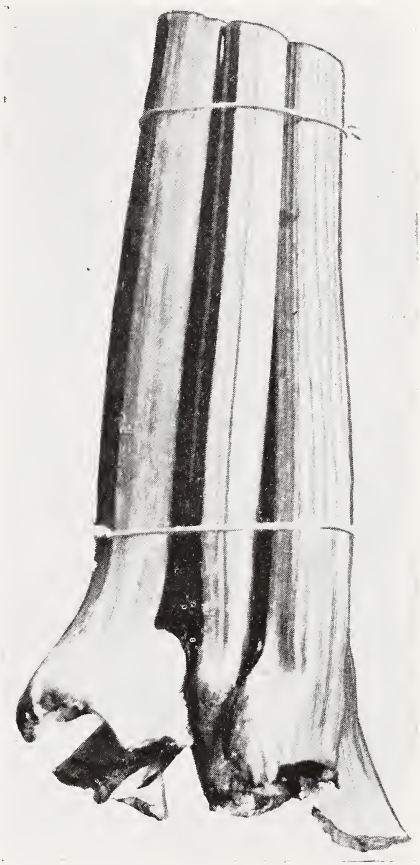


Fig. 69—A bunch of rhubarb ready for the market

The rhubarb should be cultivated to keep down the weeds. A dust mulch on the surface will conserve the soil moisture. If seedling plants are grown, the leaves should not be picked until the second year, and then only lightly. The leaves should be pulled, and not cut, and this requires a little ex-

perience to do it properly, without injury to the crown. Take hold of the stem about two-thirds of the distance from the root, and give it a quick downward and outward jerk. Pull the leaves sparingly, and be careful not to exhaust the plant. After June select only the small leafstalks to use, and allow the large, healthy ones to remain to make food for the next spring.

In the fall, cover up the roots with three or four inches of good horse manure. The following spring remove any coarse litter, and work the manure into the soil about the plant.

The bed should be renewed every four or five years. This is done by digging up the old roots and separating them. Each piece should contain two or three good, healthy buds, and after they are cut apart they should be planted in the usual way.

REVIEW QUESTIONS

1. Describe the globe artichoke.
2. How long will the asparagus live, and what is the age of a profitable commercial plantation?
3. Describe the best way of handling an asparagus bed.
4. Name the insects and the diseases that are found on the asparagus.
5. Describe the rhubarb plant and tell how to grow it.

REFERENCES:

Bulletin No. 165, University of California Agricultural Experiment Station.
Farmers' Bulletin No. 61, U. S. Department of Agriculture.

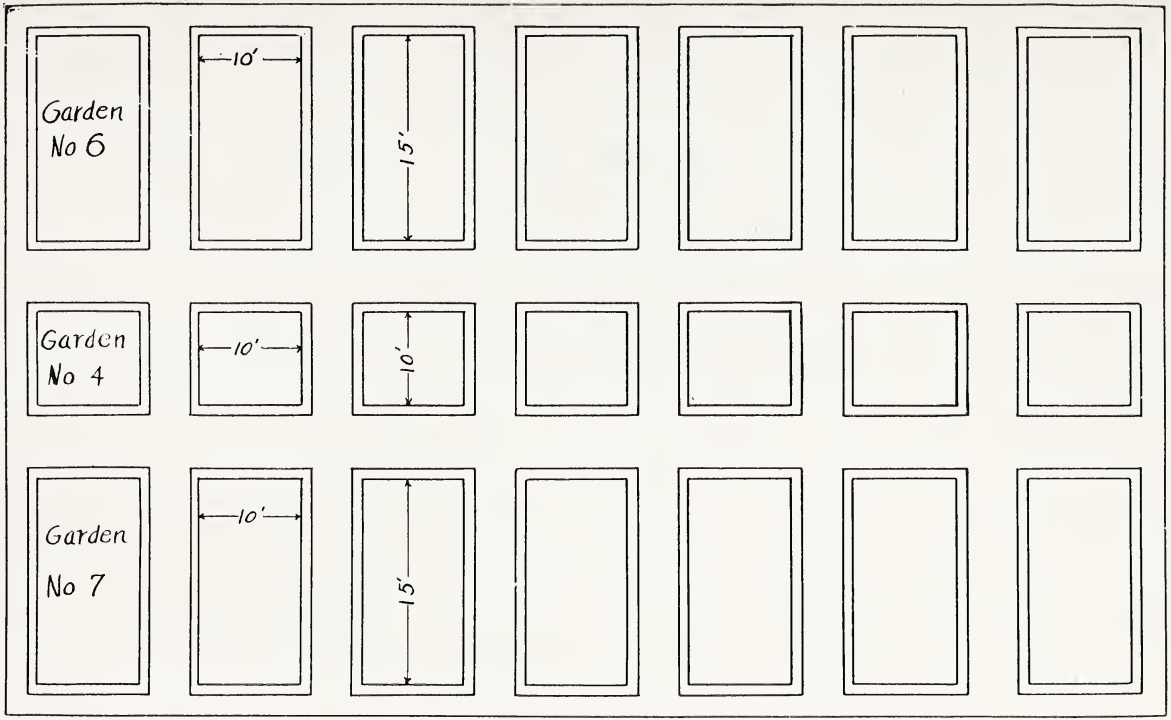


Fig. 70—A general plan of arrangement for a number of small gardens to make one large school garden. Any number of the garden plans can be made to work into this grouping. The different gardens in each row are alike.

GARDEN PLANS

DIRECTIONS FOR GARDEN I

The plan of garden one can be made either smaller or larger, according to the space that is available.

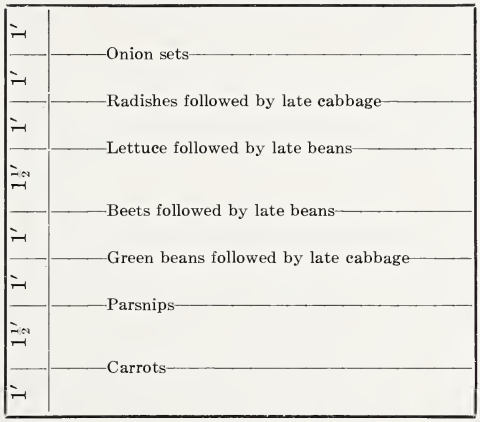
Garden I illustrates a suggestive grouping and arrangement of eight vegetables. This plan emphasizes the root crops.

First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting. As soon as you have the soil spaded and worked up in good shape, plant the beets, onions, lettuce, radishes, carrots, and parsnips. After two or three weeks, or when danger of frost is over, plant the beans. As soon as these crops are harvested, either buy or raise your late cabbage plants, and set them as directed, following the other crops.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN I

10x10 feet or 100 square feet



RECORD FOR GARDEN I

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans										
Beets										
Cabbage										
Carrots										
Lettuce										
Onion sets										
Parsnips										
Radishes										

DIRECTIONS FOR GARDEN II

The plan of garden two can be made either smaller or larger, according to the space that is available.

Garden II illustrates a suggestive grouping and arrangement of five vegetables. This plan emphasizes plants grown for their leaves and fruit.

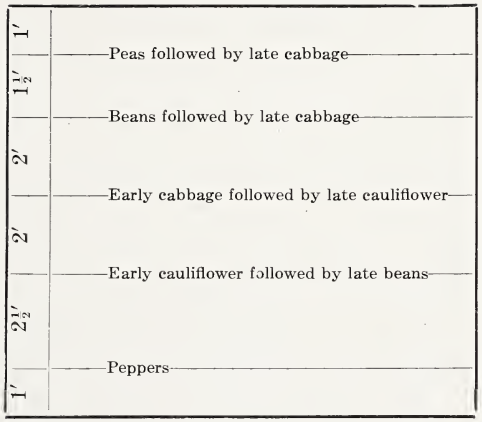
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as you have the soil spaded and worked up in good shape, plant the peas and early cabbage plants. A week or ten days later the cauliflower plants can be set in the garden. After all danger of frost is past, plant the beans and peppers.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN II

10x10 feet or 100 square feet



RECORD FOR GARDEN II

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans										
Cabbage										
Cauliflower										
Peas										
Peppers										

DIRECTIONS FOR GARDEN III

The plan of garden three can be made either smaller or larger, according to the space that is available.

Garden III illustrates a suggestive grouping and arrangement of four vegetables. This plan emphasizes plants grown for their fruits which require a long season to develop.

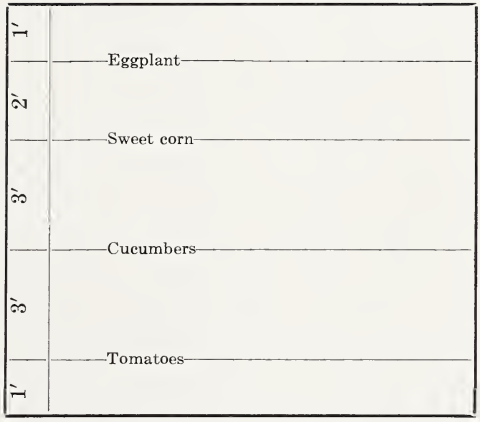
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper place. Mark each row before planting.

The plants included in this plan are all warm-season crops and none of them should be planted until danger of frost is past. When the proper time arrives, plant each crop. The time will vary according to the locality.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN III

10x10 feet or 100 square feet



RECORD FOR GARDEN III

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Cucumbers										
Eggplant										
Sweet corn										
Tomatoes										

DIRECTIONS FOR GARDEN IV

The plan for garden four can be made either smaller or larger, according to the space that is available.

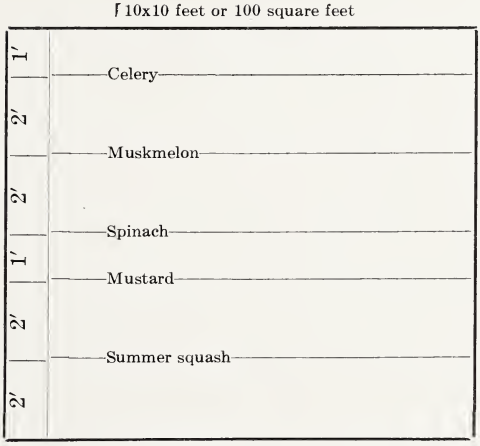
Garden IV illustrates a suggestive grouping and arrangement of five vegetables. This plan emphasizes short-season crops in combination with vine crops.

First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

The plants included in this plan are both short and long season crops, as well as hardy and tender plants. As soon as the ground is prepared, plant the celery, the spinach, and the mustard. Later in the season, and as soon as danger of frost is past, plant the muskmelon and the summer squash. The first three crops occupy the soil for a short time and they should be removed as soon as matured, which will give room for the late plants to occupy all of the ground.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN IV



RECORD FOR GARDEN IV

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Celery										
Muskmelon										
Mustard										
Spinach										
Summer squash										

DIRECTIONS FOR GARDEN V

The plan of garden five can be made either smaller or larger, according to the space that is available.

Garden V illustrates a suggestive grouping and arrangement of six vegetables. This plan introduces succession crops, which follow short-season crops.

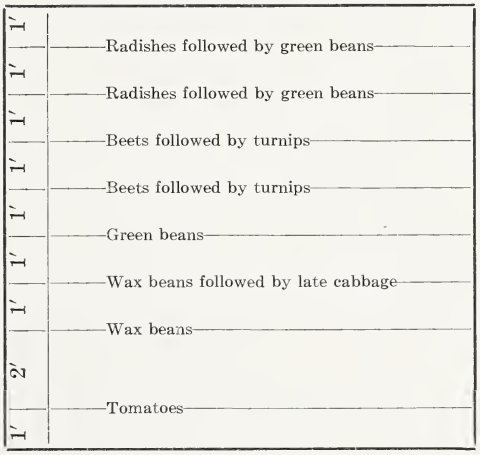
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

This plan includes short season crops that occupy the ground for only a short time, with the exception of the tomato. Successsion cropping is here emphasized. As soon as the ground can be worked in the spring, plant the radishes and beets. When danger of frost is past, plant the beans and tomatoes. Harvest all of the early vegetables as soon as they are mature, prepare the soil again, and plant the beans, turnips, and late cabbage.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN V

10x10 feet or 100 square feet



RECORD FOR GARDEN V

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans, green										
Beans, wax										
Beets										
Cabbage										
Radishes										
Tomatoes										
Turnips										

DIRECTIONS FOR GARDEN VI

The plan of garden six can be made either smaller or larger, according to the space that is available.

Garden VI illustrates a suggestive grouping and arrangement of six vegetables. This plan emphasizes short- and long-season crops as well as succession cropping.

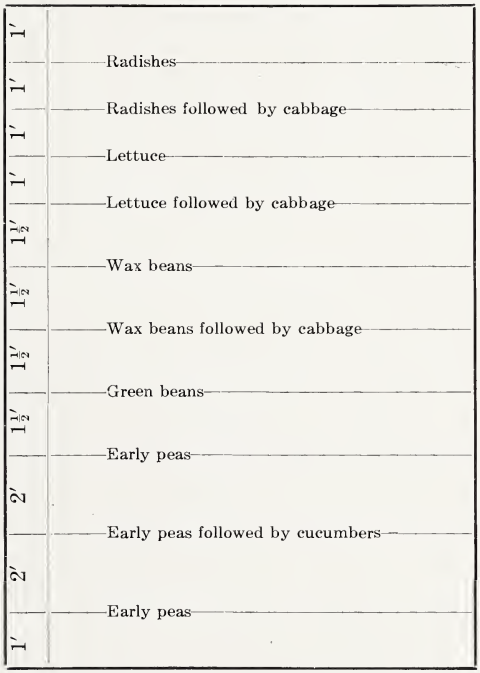
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

This plan includes early short-season crops followed by late short-season vegetables. As soon as the ground is prepared, plant the radishes, lettuce, and peas. After danger of frost is past, plant the beans. When the radishes and lettuce are harvested plant the cabbage, and after the beans and peas are removed plant the cucumbers and the remaining part of the cabbage.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN VI

10x15 feet or 150 square feet



RECORD FOR GARDEN VI

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price re'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans										
Cabbage										
Cucumbers										
Lettuce										
Peas										
Radishes										

DIRECTIONS FOR GARDEN VII

The plan of garden seven can be made either smaller or larger, according to the space that is available.

Garden VII illustrates a suggestive grouping and arrangement of three vegetables. This plan emphasizes plants grown for their fruits, succession cropping, and intensive planting. This garden finishes up with tomatoes.

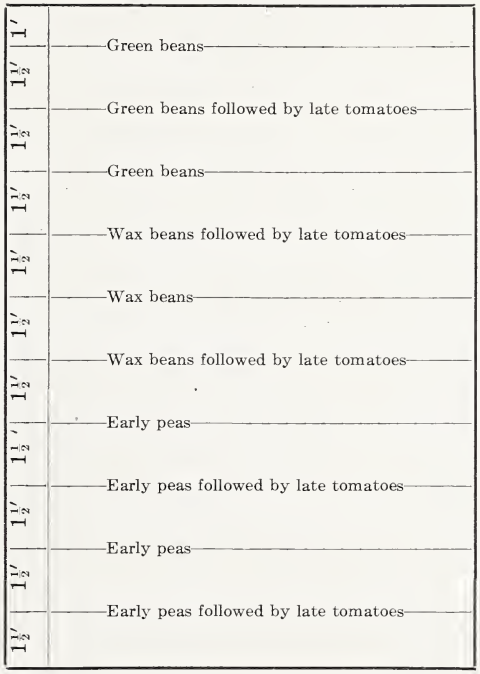
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Now measure the distance between the rows, and set stakes at the proper places. Mark each row before planting.

The early peas should be planted as soon as the soil is prepared. Use a dwarf variety. As soon as danger of frost is over, plant the beans. When the peas and beans are two-thirds matured, set the tomato plants among the beans and peas. This is done by measuring off the proper distance for each tomato plant, then pulling up the bean or pea plant and setting the tomato in its place. As soon as the beans and peas are harvested, remove the vines to give the room to the tomatoes.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN VII

10x16 feet or 160 square feet



RECORD FOR GARDEN VII

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans, green										
Beans, wax										
Peas, early										
Tomatoes, late										

DIRECTIONS FOR GARDEN VIII

The plan for garden eight can be made either smaller or larger, according to the space that is available.

Garden VIII illustrates a suggestive grouping and arrangement of five vegetables. This plan emphasizes principally vegetables grown for their leaves, succession cropping, and intensive planting. This garden finishes up with late cabbage.

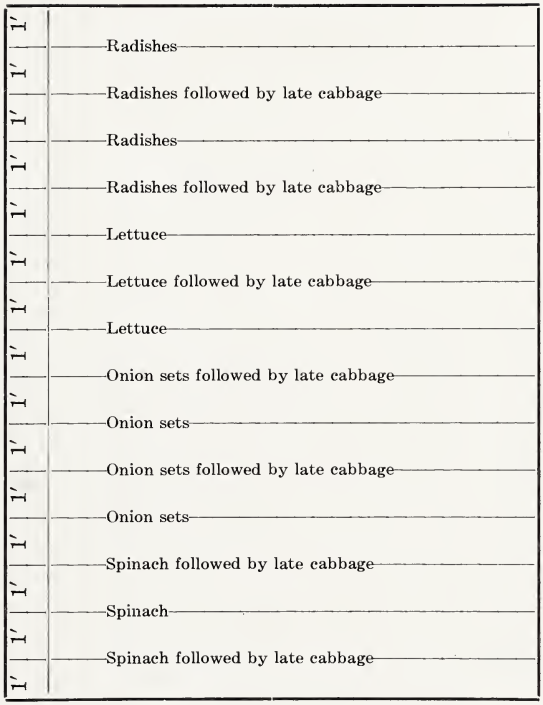
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

The plants included in this garden are all cool weather vegetables. The radishes, lettuce, onion sets, and spinach should be planted early in the spring and as soon as the ground is prepared. When the early vegetables are harvested plant the late cabbage as indicated, which will mature in the fall. The cabbage plants can be either grown or purchased.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN VIII

10x15 feet or 150 square feet



RECORD FOR GARDEN VIII

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Cabbage										
Lettuce										
Onions										
Radishes										
Spinach										

DIRECTIONS FOR GARDEN IX

The plan of garden nine can be made either smaller or larger, according to the space that is available.

Garden IX illustrates a suggestive grouping and arrangement of twelve vegetables. This plan emphasizes a variety of plants for a home garden. Both short- and long-season crops appear in this plan as well as succession cropping.

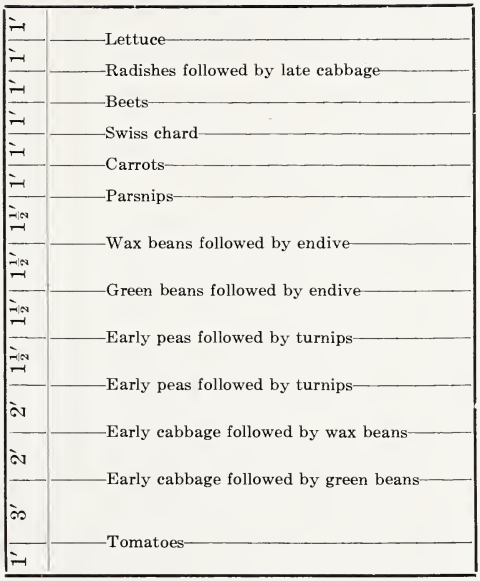
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between the rows, and set stakes at the proper places. Mark each row before planting.

Plant the seed of the lettuce, radishes, beets, swiss chard, carrots, parsnips, and peas as soon as the ground can be worked. A couple of weeks later, or after danger of severe freezing is past, set the early cabbage plants. After all danger of frost is past, plant the bean seed and the tomato plants. As soon as the lettuce, radishes, and beets are gathered, follow the radishes with late cabbage. After the beans, peas, and early cabbage are gathered, follow each crop with its respective vegetable.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN IX

15x20 feet or 300 square feet



RECORD FOR GARDEN IX

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans, green										
Beans, wax										
Beets										
Cabbage, early										
Cabbage, late										
Carrots										
Endive										
Lettuce										
Peas, early										
Parsnips										
Radishes										
Swiss chard										
Tomatoes										
Turnips										

DIRECTIONS FOR GARDEN X

The plan of garden ten can be made either smaller or larger, according to the space that is available.

Garden X illustrates a suggestive grouping and arrangement of seven vegetables. This plan emphasizes fewer plants and greater quantity for a home garden.

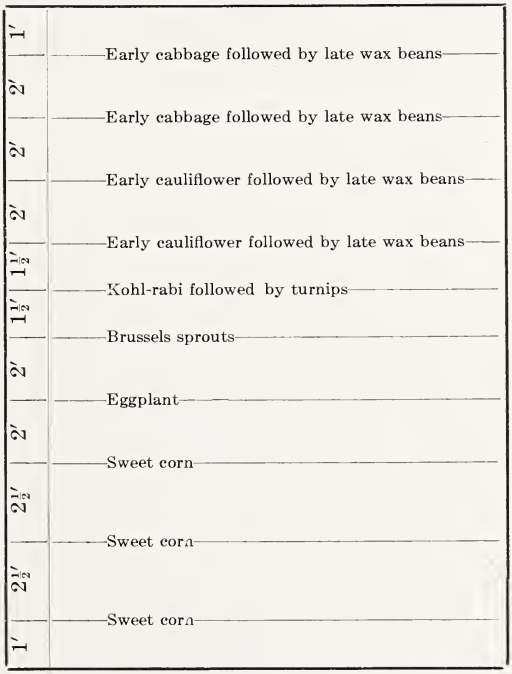
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between the rows, and set stakes at the proper places. Mark each row before planting.

The cabbage, cauliflower, kohl-rabi, and brussels sprouts all belong to the same family of plants, and are hardy. Set out plants of the cabbage, cauliflower, and brussels sprouts and plant the seed of the kohl-rabi after danger of severe freezing is past. A couple of weeks later, when there is no danger of frost, plant the eggplant and the sweet corn. As soon as the early crops are matured and gathered, prepare the soil again and plant the late beans and the turnips.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN X

15x20 feet or 300 square feet



RECORD FOR GARDEN X

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans										
Brussels sprouts										
Cabbage, early										
Cauliflower										
Eggplant										
Kohl-rabi										
Sweet corn										

DIRECTIONS FOR GARDEN XI

The plan of garden eleven can be made either smaller or larger, according to the space that is available.

Garden XI illustrates a suggestive grouping and arrangement of seven vegetables. This plan emphasizes quick growing plants as well as a vine crop.

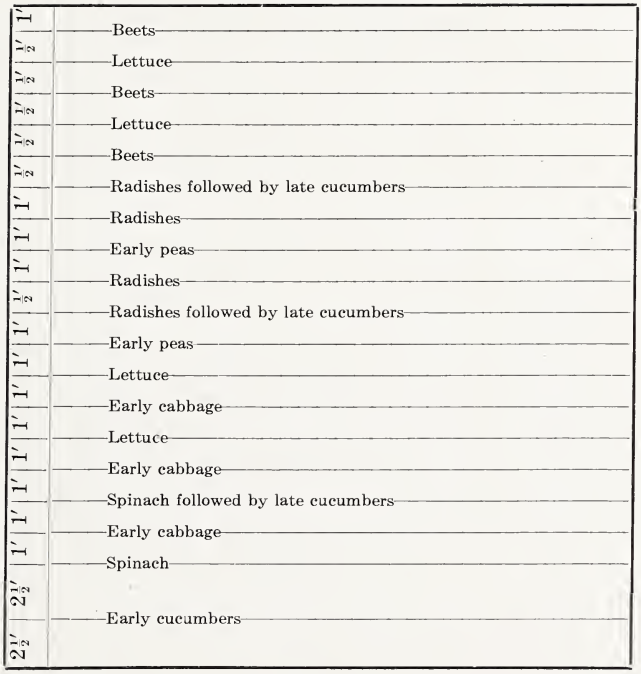
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between the rows, and set stakes at the proper places. Mark each row before planting.

The seed of the beets, lettuce, radishes, peas, and spinach should be planted as early in the spring as the soil can be prepared. About two weeks later or after danger of severe freezing is over, set the early cabbage plants. As soon as the early vegetables are harvested, plant the cucumbers. The cucumbers will come on later and finally occupy all of the ground and give a good supply of pickles.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XI

15x20 feet or 300 square feet



RECORD FOR GARDEN XI

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beets										
Cabbage										
Cucumbers										
Lettuce										
Peas										
Radishes										
Spinach										

DIRECTIONS FOR GARDEN XII

The plan for garden twelve can be made either smaller or larger, according to the space that is available.

Garden XII illustrates a suggestive grouping and arrangement of four vegetables. This plan emphasizes quick growing vegetables and companion cropping.

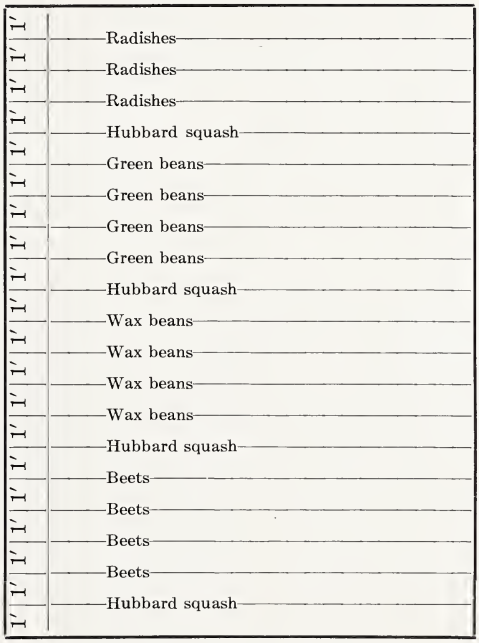
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

Plant the seed of the radish and the beets as soon as the soil is prepared in the spring. A few weeks later, after danger of frost is over, plant the beans. A week or ten days after the beans have been planted, place the squash seed in the ground. When the radishes, beans, and beets have matured, they should be removed, so the ground can be used by the squash.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XII

15x20 feet or 300 square feet



RECORD FOR GARDEN XII

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans, green										
Beans, wax										
Beets										
Hubbard squash										
Radishes										

DIRECTIONS FOR GARDEN XIII

The plan of garden thirteen can be made either smaller or larger, according to the space that is available.

Garden XIII illustrates a suggestive grouping and arrangement of two vegetables. This plan emphasizes an early and a late crop, each of which requires little attention.

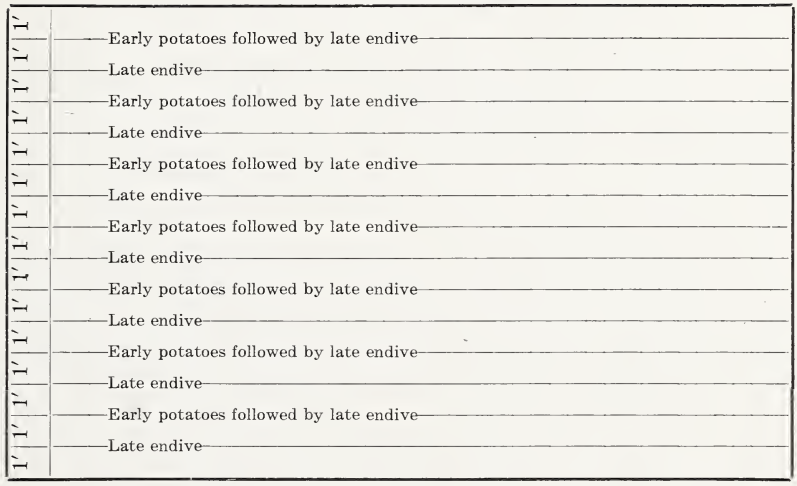
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

The potatoes will stand cool weather and they should be planted early, just as soon as there is no danger of severe freezing. Prepare the seed by soaking it in a formalin solution for two hours. The solution is made by dissolving one-half pint of formalin in 15 gallons of water. As soon as the potatoes are large enough to market, harvest them. Remove all vines, spade the ground again and prepare a good seed bed. Plant the endive and grow the plant for a fall and winter crop. The endive should be planted about the first of August.

Keep accurate records, in order to determine which crop is the more profitable.

GARDEN PLAN XIII

15x20 feet or 300 square feet



RECORD FOR GARDEN XIII

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Endive										
Potatoes										

DIRECTIONS FOR GARDEN XIV

The plan for garden fourteen can be made either smaller or larger, according to the space that is available.

Garden XIV illustrates a suggestive grouping and arrangement of four vegetables. This plan emphasizes short- and long-season crops as well as succession planting.

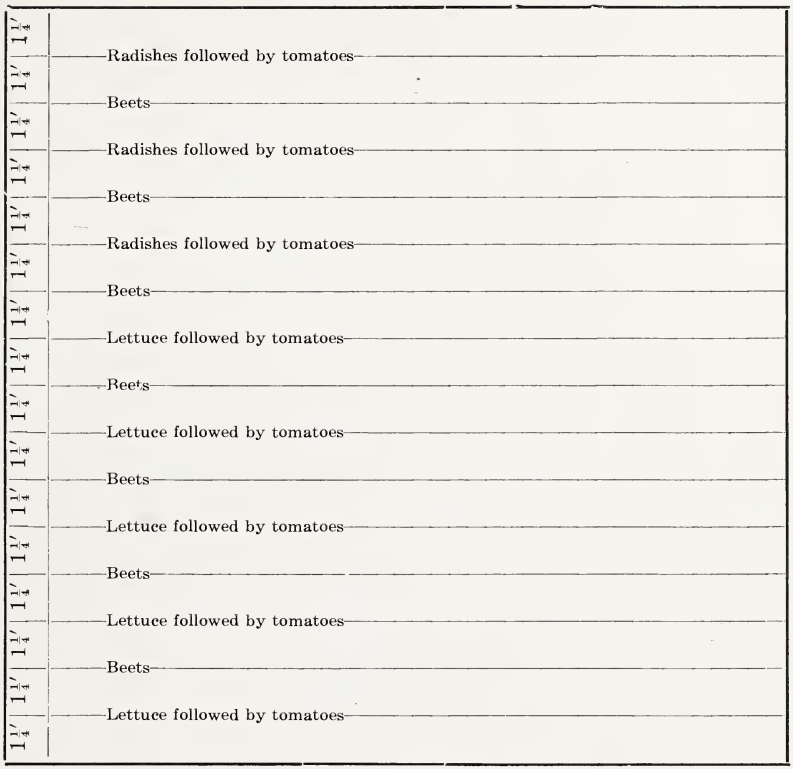
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the soil is prepared, sow the radish and the beet seed. Set lettuce plants that have been started in either a hotbed or a window box, or sow the seed in the garden. As soon as the lettuce and radishes are harvested, set the tomato plants. If the lettuce and radishes are not harvested by the last of May, set the tomatoes among the plants, removing the remaining lettuce and radishes as soon as they are mature. By the time the tomatoes are large enough to crowd, the beets should all have been harvested.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XIV

20x25 feet or 500 square feet



RECORD FOR GARDEN XIV

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beets										
Lettuce										
Radishes										
Tomatoes										

DIRECTIONS FOR GARDEN XV

The plan of garden fifteen can be made either smaller or larger, according to the space that is available.

Garden XV illustrates a suggestive grouping and arrangement of three vegetables. This plan emphasizes early and late crops.

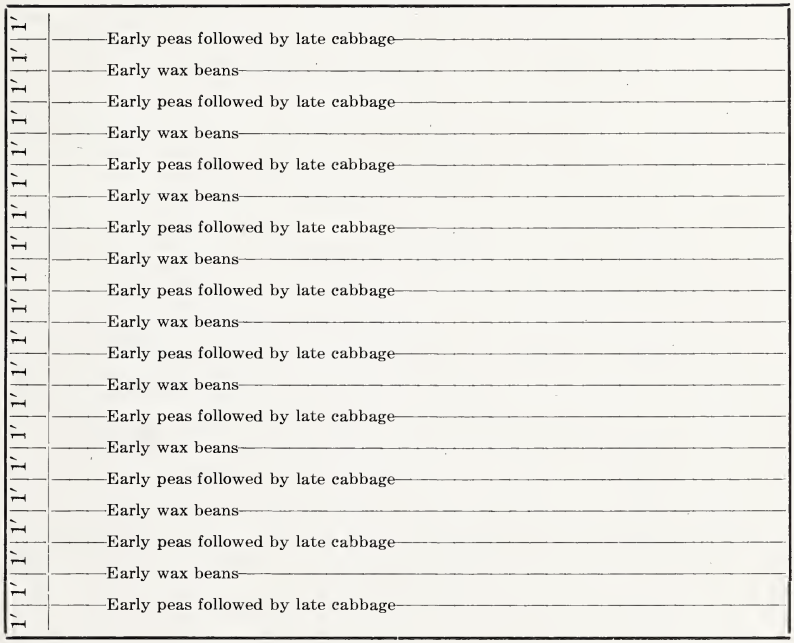
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the soil is prepared, which should be early in the spring, plant the peas. Dwarf varieties of peas should be selected. A few weeks later, after danger of frost is past, plant the beans. After the peas are matured and harvested, remove the vines and set the late cabbage plants.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XV

20x25 feet or 500 square feet



RECORD FOR GARDEN XV

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans										
Cabbage										
Peas										

DIRECTIONS FOR GARDEN XVI

The plan of garden sixteen can be made either smaller or larger, according to the space that is available.

Garden XVI illustrates a suggestive grouping and arrangement of two vegetables. This plan emphasizes a short-season plant and a vine crop.

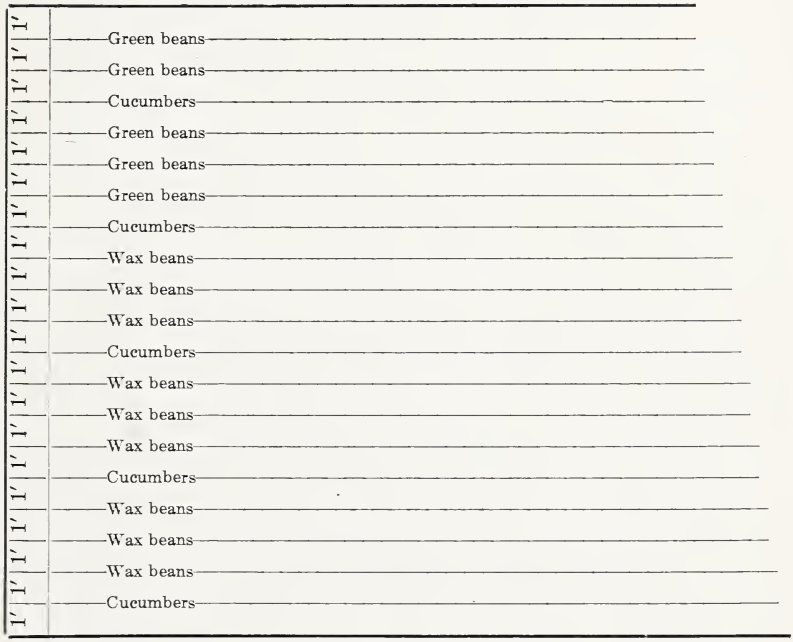
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

Prepare the soil early in the spring, and after danger of frost is over plant the seed of the green and the wax podded beans. Only dwarf or bush beans should be selected. A month after the beans are up, plant the cucumber seed. The seeds of the cucumber should be planted in rows about five or six inches apart, and later thin the plants to about one foot apart. As soon as the beans are matured and harvested, they should be removed to give the room to the cucumbers.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XVI

20x40 feet or 800 square feet



RECORD FOR GARDEN XVI

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Beans, green										
Beans, wax										
Cucumbers										

DIRECTIONS FOR GARDEN XVII

The plan of garden seventeen can be made either smaller or larger, according to the space that is available.

Garden XVII illustrates a suggestive grouping and arrangement of five vegetables. This plan emphasizes short- and long-season plants as well as companion cropping.

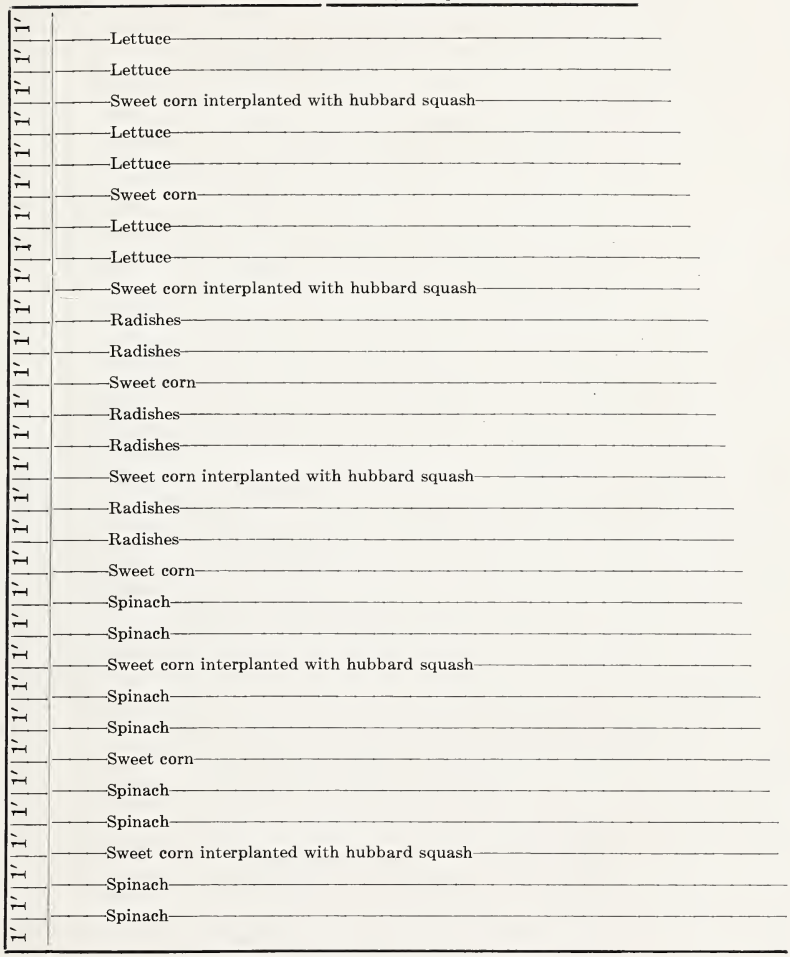
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade the ground eight to ten inches deep, break up all large lumps, and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

Prepare the ground as early in the spring as possible, and plant the lettuce, radish, and spinach seed. Lettuce plants may be substituted for the seed if the plants are available. After danger of frost is over, plant the corn. Select some early maturing variety of corn. When the corn is three or four inches high plant the hubbard squash, six feet apart in the rows between the corn plants. Remove the spinach, lettuce, and radishes as soon as they are mature, to give room for the corn. As soon as the corn is harvested, cut and remove the stalks. This will give all of the room for the squash.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XVII

30x40 feet or 1,200 square feet



RECORD FOR GARDEN XVII

Vegetable	Date of planting		Date first gathered		Date last gathered		Total yield		Price rec'd	
	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year	1st year	2d year
Hubbard squash										
Lettuce										
Radishes										
Spinach										
Sweet corn										

DIRECTIONS FOR GARDEN XVIII

The plan of garden eighteen can be made either smaller or larger, according to the space that is available.

Garden XVIII illustrates a suggestive grouping and arrangement of a variety of vegetables for the home. Sixteen vegetables are grown in this garden.

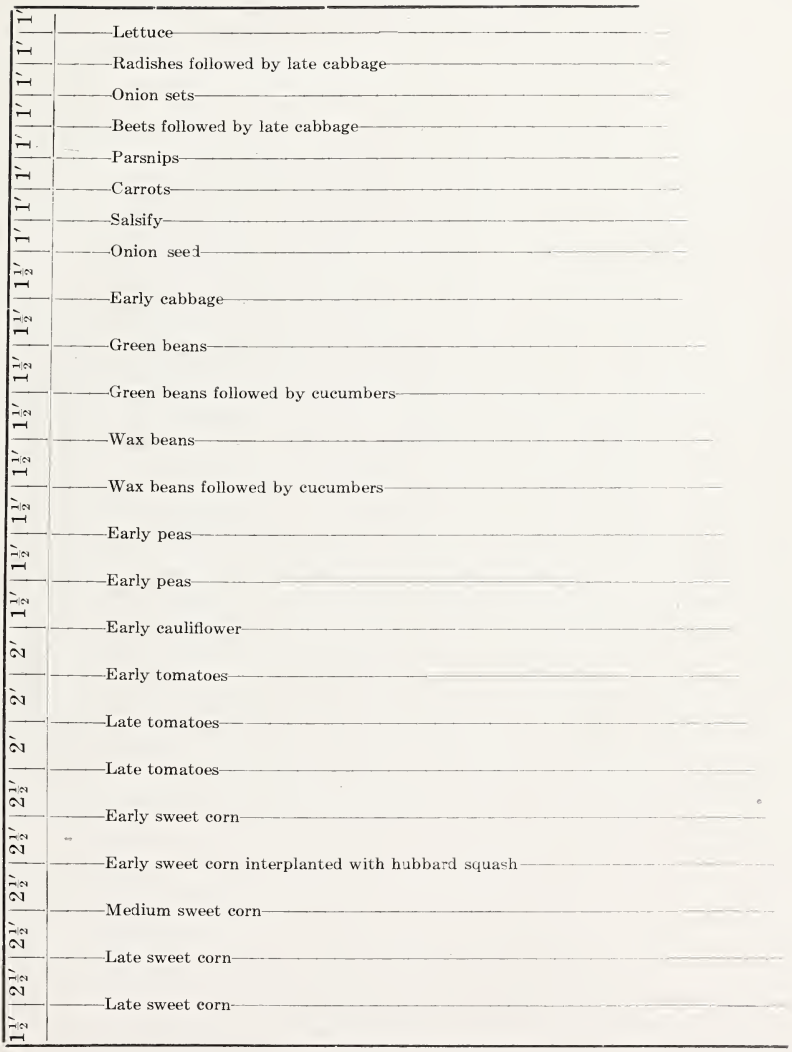
Measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade or plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

The lettuce, radishes, onions, beets, parsnips, carrots, salsify, and early peas can be planted as soon as the ground is prepared. After danger of frost is over, plant the beans, early cauliflower, sweet corn, and tomatoes. As soon as the early crops are matured, remove them and plant the late cabbage and the cucumbers. When the early corn is three or four inches high, plant the hubbard squash between the corn rows. Either select early and late varieties of tomatoes and corn, or plant early varieties at intervals of ten days or two weeks. Remove each crop as it matures to give room for the later crop. The tomato plants should be pruned and staked.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XVIII

40x50 feet or 2,000 square feet



DIRECTIONS FOR GARDEN XIX

The plan of garden nineteen can be made either smaller or larger, according to the space that is available.

Garden XIX illustrates a suggestive grouping and arrangement of four vegetables. Short- and long-season crops are grown and succession cropping is practiced.

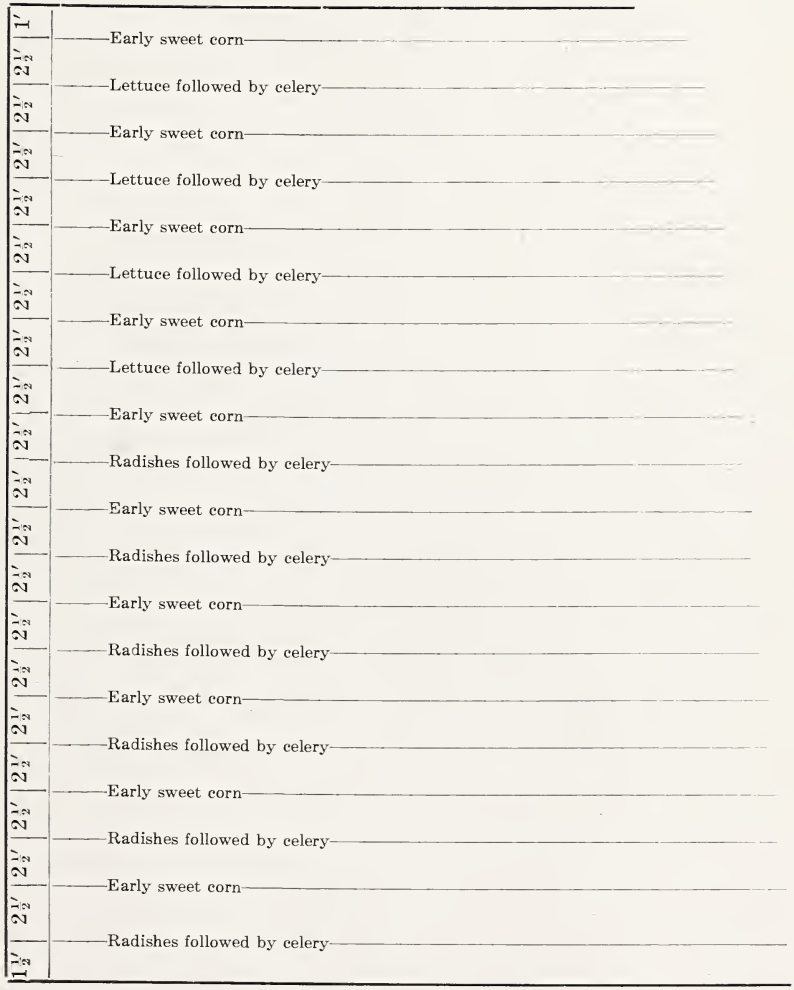
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, spade or plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the ground is prepared in the spring, plant the lettuce and the radishes. A few weeks later, after danger of frost is past, plant the sweet corn. Select an early maturing, low growing variety of corn like the Golden Bantam. Harvest the lettuce and the radishes as soon as they are mature, to make room for the corn. Sow the seed for the late celery plants about the first of May, and transplant them in the garden when they are large enough. Remove the corn as soon as it is matured, to give room to the celery.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XIX

50x70 feet or 3,500 square feet



DIRECTIONS FOR GARDEN XX

The plan of garden twenty can be made either smaller or larger, according to the space that is available.

Garden XX illustrates a suggestive grouping and arrangement of a number of vegetables suitable for the home garden. This garden is approximately the size of a city lot.

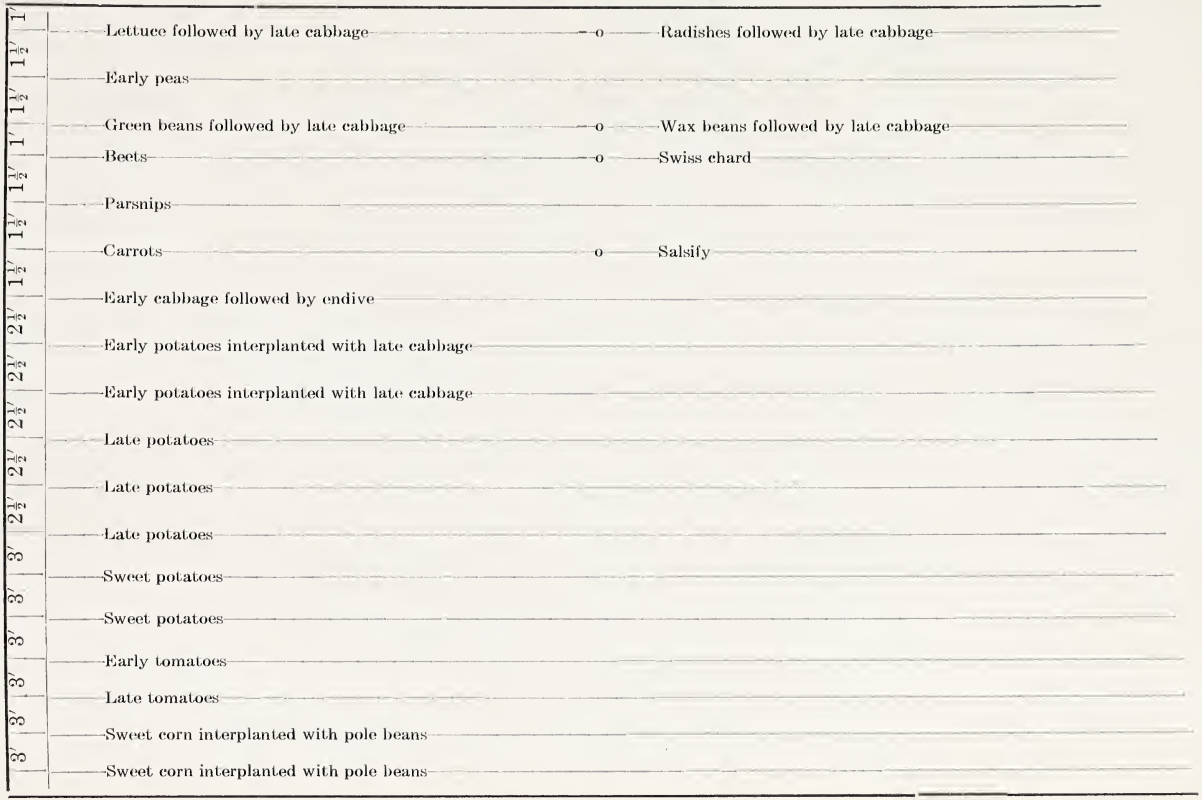
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

The rows of this garden are long and for some of the earlier vegetables the rows can be divided into halves as indicated by the little circles. Plant the lettuce, radishes, early peas, beets, parsnips, carrots, early potatoes, Swiss chard, and salsify as soon as the ground is prepared. A couple of weeks later, after danger of frost is past, plant the sweet potatoes, tomatoes, sweet corn, beans, and late potatoes. When the corn is eight or ten inches high, plant the pole beans close to each hill of corn. Remove the early crops as soon as they mature and plant the late crops as indicated. Select an early and a late variety of tomatoes.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XX

40x140 feet or 5,600 square feet



DIRECTIONS FOR GARDEN XXI

The plan of garden twenty-one can be made either smaller or larger, according to the space that is available.

Garden XXI illustrates a suggestive grouping and arrangement of five vegetables for a small commercial garden. This garden is approximately the size of a city lot.

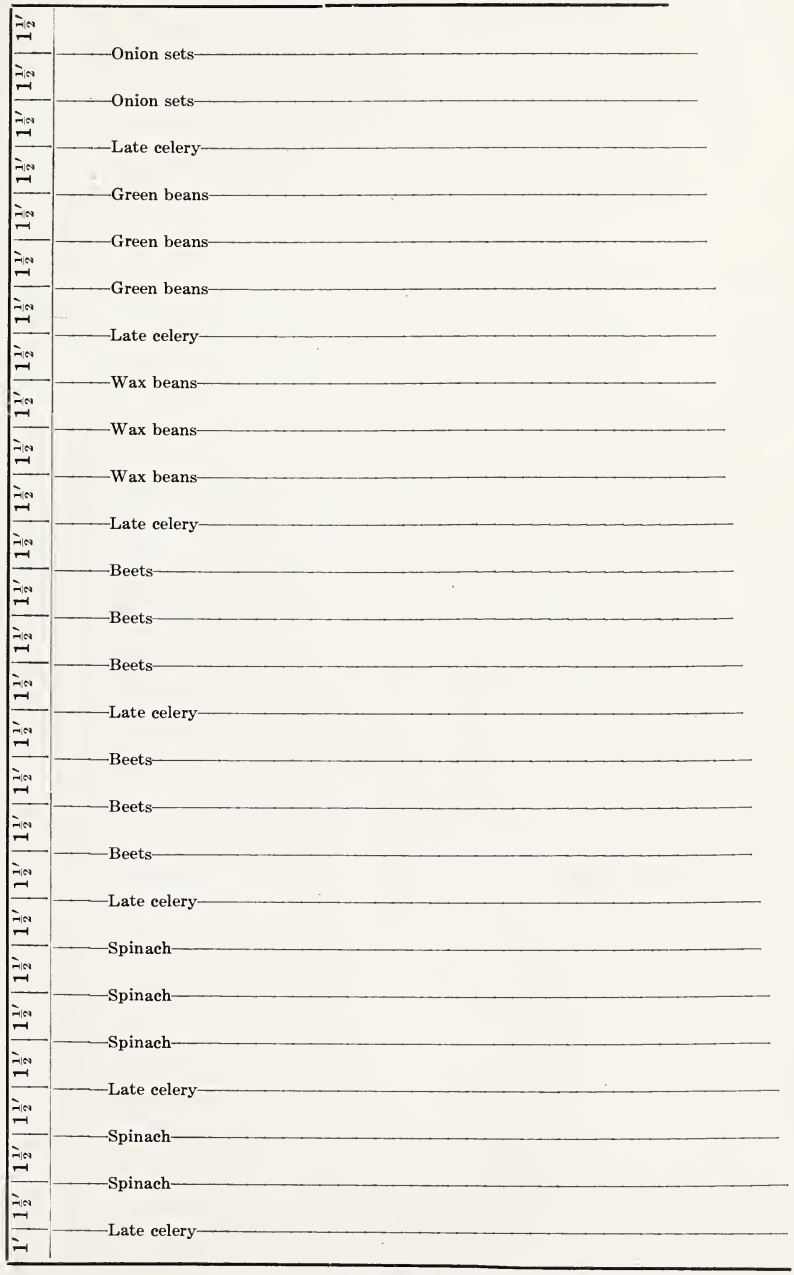
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the ground is prepared, plant the onion sets, and the beet and spinach seed. A few weeks later, after danger of frost is past, plant the beans. Harvest each crop as soon as it is mature and remove all of the vegetation. During the early part of May plant the celery seed for your late plants, and when they reach the proper size, set them in the garden. The late celery will grow and produce a late crop. Blanch the celery by hilling up the plants with soil.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XXI

40x140 feet or 5,600 square feet



DIRECTIONS FOR GARDEN XXII

The plan for garden twenty-two can be made either smaller or larger, according to the space that is available.

Garden XXII illustrates a suggestive grouping and arrangement of three vegetables for a small commercial garden. This garden is approximately the size of a city lot.

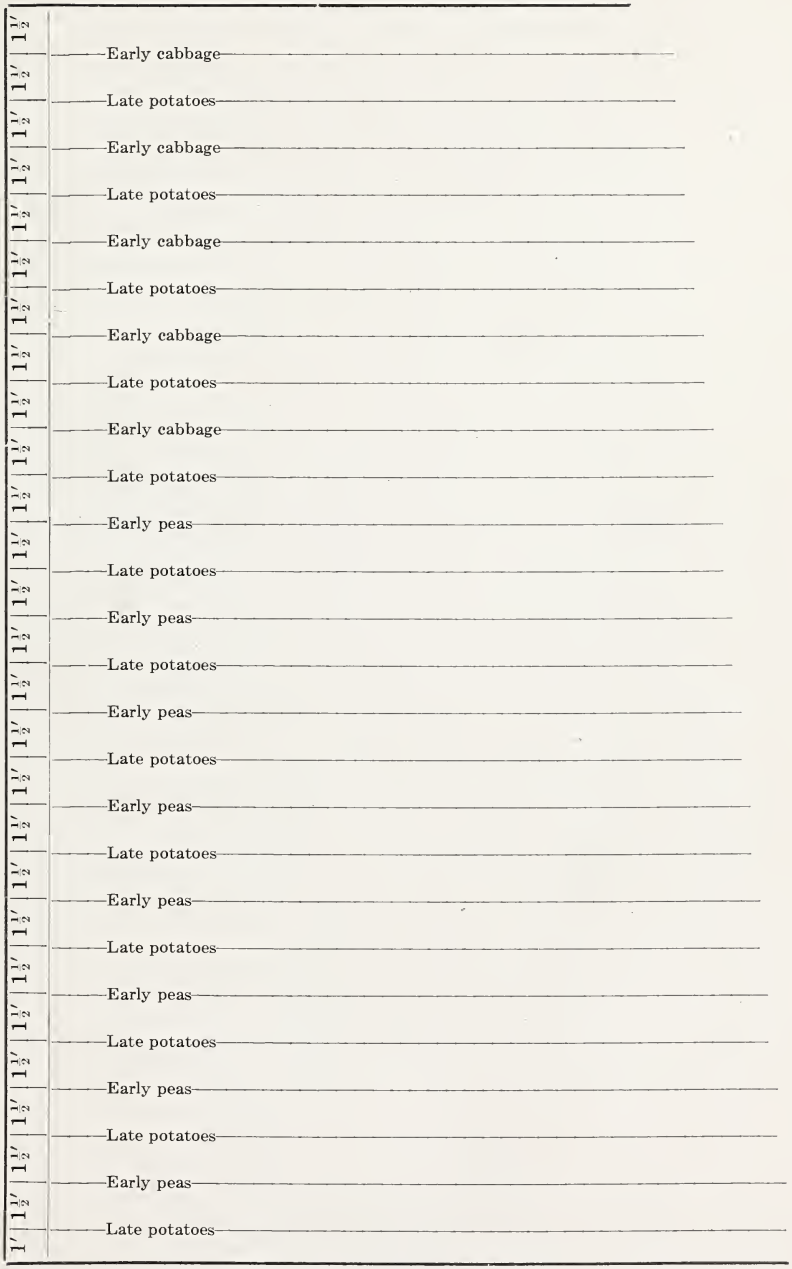
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the ground is prepared in the spring, plant the early peas. A small growing, early maturing variety should be selected. A week or so later, after danger of severe freezing is past, set the early cabbage plants. Select an early maturing variety of cabbage, such as the early Jersey Wakefield. A month or so later, or when the proper time comes, plant the late potatoes. As soon as the cabbage and the peas are mature, remove them, so as to give the room to the late potatoes.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XXII

40x140 feet or 5,600 square feet



DIRECTIONS FOR GARDEN XXIII

The plan of garden twenty-three can be made either smaller or larger, according to the space that is available.

Garden XXIII illustrates a suggestive grouping and arrangement of a number of vegetables, suitable for the suburban home or a small commercial garden. This garden is approximately the size of two small city lots.

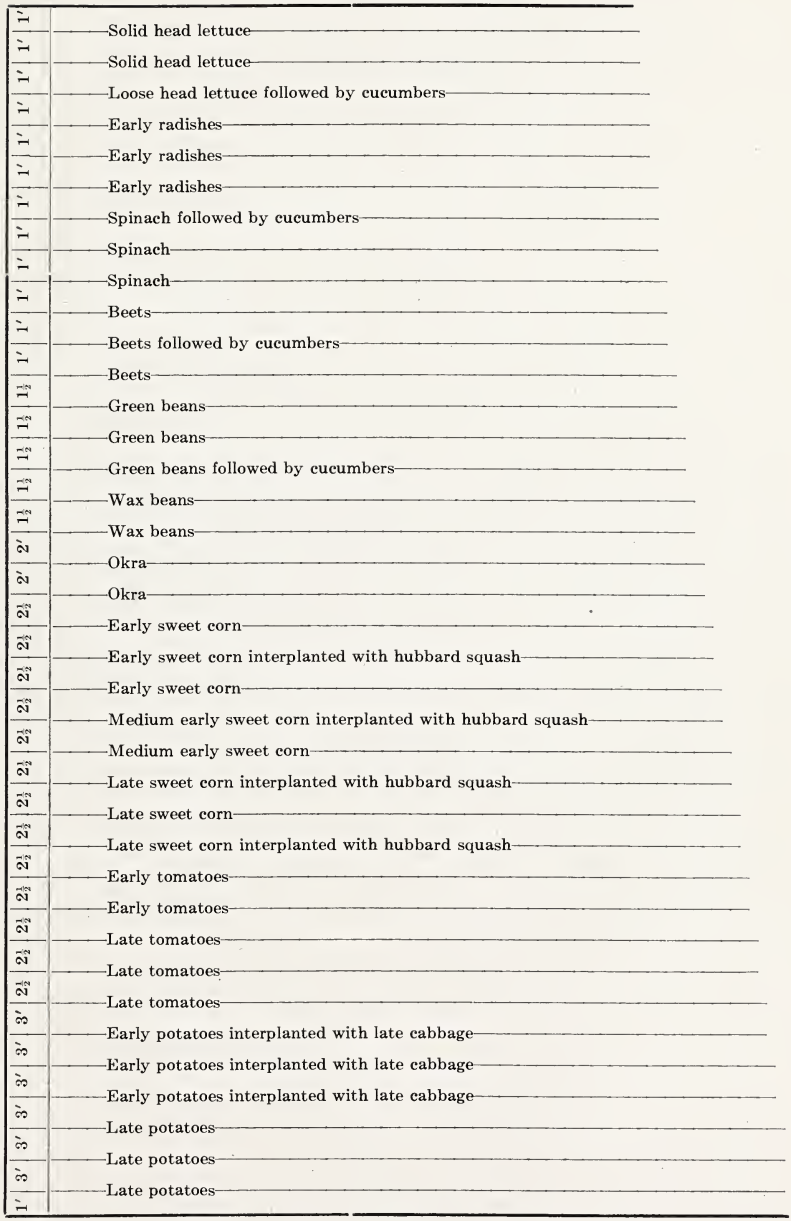
First measure off the garden, and place four stakes, one at each corner. When this operation is finished, plow the ground eight to ten inches deep, break up all large lumps, and harrow and rake the surface of the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

Plant one row of the radishes, lettuce, spinach, beets, and early potatoes as soon as the ground is prepared, and the remaining rows a week apart. This gives a longer supply of each crop. After danger of frost is past, plant the beans, okra, corn, tomatoes, and late potatoes. Select one early and one late variety of tomatoes. As soon as the early crops have matured they should be removed in order to give all of the ground to the late crops. If the beets and the beans are not harvested when it is time to plant the cucumbers, pull one or two plants up at the proper places, and plant the seed of the cucumber. Remove the beans and the beets as soon as they mature. About the first of July, set the late cabbage plants between the rows of early potatoes. Lay back the vines so as not to crowd the cabbage. Remove all of the potato vines as soon as the crop is matured.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XXIII

75x100 feet or 7,500 square feet



DIRECTIONS FOR GARDEN XXIV

The plan of garden twenty-four can be made either smaller or larger, according to the space that is available.

Garden XXIV illustrates a suggestive grouping and arrangement of a number of vegetables for a small commercial garden. This garden is approximately the size of two city lots, or a little less than one-fourth of an acre.

First measure off the ground, and place four stakes, one at each corner. When this operation is finished, plow the ground eight to ten inches deep. Harrow and rake the soil until it is fine and smooth. Now measure the distance between each row, and set stakes at the proper places. Mark each row before planting.

As soon as the ground is prepared, plant the lettuce, onion sets, radishes, early celery, and early potatoes. After danger of frost is past, plant the early cucumbers, bush lima beans, summer squash, late potatoes, and sweet corn. As soon as the lettuce, onions, and radishes are harvested, plant the late celery. After the early celery, cucumbers, and early potatoes are harvested, plant the late beans, endive and late cabbage. When the sweet corn is three or four inches high, plant the hubbard squash in the corn. Cut the corn as soon as the ears are gathered, to give the room to the squash.

Keep accurate records, in order to determine which crop is the most profitable.

GARDEN PLAN XXIV

80x150 feet or 12,000 square feet

Space	Row
1′	
	Lettuce followed by late celery
1′	
	Lettuce
1′	
	Lettuce
1′	
	Onion sets followed by late celery
1′	
	Onion sets
1′	
	Radishes followed by late celery
1′	
	Radishes
2′	
	Early celery followed by late green beans
3′	
	Early celery followed by late green beans
3′	
	Early celery followed by late green beans
3′	
	Early cucumbers followed by late endive
2′	
	Late endive
2′	
	Early cucumbers followed by late endive
2′	
	Late endive
2′	
	Early cucumbers followed by late endive
2′	
	Bush lima beans
2′	
	Bush lima beans
2′	
	Bush lima beans
3′	
	Summer squash
3′	
	Early potatoes
3′	
	Early potatoes followed by late cabbage
3′	
	Early potatoes followed by late cabbage
3′	
	Early potatoes followed by late cabbage
3′	
	Early potatoes followed by late cabbage
3′	
	Late potatoes
3′	
	Late potatoes
3′	
	Late potatoes
3′	
	Late potatoes
3′	
	Early sweet corn
3′	
	Early sweet corn interplanted with hubbard squash
3′	
	Early sweet corn
3′	
	Late sweet corn
3′	
	Late sweet corn
3′	

AGRICULTURAL EXPERIMENT STATIONS

Every state agricultural experiment station publishes bulletins dealing with agricultural subjects. These bulletins are sent free to all residents of the state and contain much valuable information. A letter should be addressed to the directors of the stations with a request for their list of available bulletins. From this list select the bulletins which will be of value to you and have them sent to your address.

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