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WAR GARDENS



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WAR GARDENS



WAR GARDENS

A Pocket Guide for Home Vegetable Growers

BY

MONTAGUE FREE

*Head Gardener
Brooklyn Botanic Garden*



HARPER & BROTHERS PUBLISHERS
NEW YORK AND LONDON

WAR GARDENS

A Pocket Guide for
Home Vegetable Growers

BY

MONTAGUE FLEMING

Author of "The War Garden" and "The War Garden Book"

Illustrations by MONTAGUE FLEMING



WAR GARDENS

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PREFACE

THE purpose of this book is to state simply and clearly the ways and means necessary to obtain the largest returns from small plots of land.

The conditions are anything but ideal in the case of many plots that will be used as "war gardens." To tell how to overcome these adverse conditions, either by adapting the crop to soil and situation, or by modifying the soil to suit the crop, is one of the primary objects of this book.

In the writer's varied experience with back-yard and vacant-lot gardens, questions relating to soils and fertilizers, insects and diseases, when and what to plant, etc., are continually cropping up. Answers to these questions are given here without theorizing or going into needless details.

This is essentially a practical book, designed to help those who desire to raise their own vegetables in a limited space.

M. F.

WAR GARDENS

WAR GARDENS

I

THE VALUE OF BACK-YARD AND VACANT-LOT GARDENING

THE National War Garden Commission has estimated that "the people of this country in 1917 produced a crop valued at three hundred and fifty million dollars in gardens cultivated in back yards, on vacant lots, and on other land previously untilled." This may seem a small amount when compared with the value of the crops raised by the farmers and market gardeners, but it is not to be despised, and it shows that something can be done to increase the food supply by home gardening.

The raising of vegetables at home not only increases food production, but also stimulates the consumption of vegetables, thus releasing

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staples, such as wheat and meat, for the use of our soldiers and the Allies. This result is attained partly because fresh vegetables are more appetizing than shop-worn products and partly because of the attitude of the raiser, who says, "We have the stuff and may as well eat it."

The reduction in the cost of living is also a factor that must be considered. When vegetables are bought their purchase price is quite a considerable item in the household budget. Of course if labor is figured in the cost of raising vegetables at home the financial returns are not likely to be large unless you take into consideration the fact that the necessity of paying dues for gymnasium, tennis, or golf is entirely eliminated. Plenty of fresh air *and* exercise can be obtained in gardening.

Home gardening, too, should help the transportation problem to a certain extent. Most of the vegetables consumed in the large cities are transported a considerable distance, and if those people who eat these much-traveled vegetables raise their own, the transportation system will be relieved to that amount.

The raising and caring for plants is certain to broaden one's interest. Very few people

BACK YARDS AND VACANT LOTS

who cultivate a vegetable-garden, or any other kind of garden, for that matter, are likely to be satisfied until they know something of the physiology of plants, how and why they grow, and the principles underlying successful plant culture. The insects, both beneficial and otherwise, that one becomes acquainted with in the garden also add their quota of interest. The life histories of many of them are strange and marvelous, and it is worth while, both from the point of view of the welfare of the crops and from the educational standpoint, to learn something of their habits.

But it is probably in the larger aspects of the situation that the home-garden movement will ultimately be of greatest value to the nation. America is not a gardening nation judged from European standards, but this agitation for the production of food by every one who has, or can obtain, a plot of ground is going to make us one. Those people who have once cultivated the ground and raised plants will have had their interest stimulated, and when the food shortage is over their activities will find an outlet in the production of flowers, which cannot but result in more beautiful cities and happier citizens.

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A healthier population will result from the exercise in the open air and we shall become a less nervous and restless people through our association with the vital soil and living, growing plants.

II

HOW TO MAKE A START—COMMUNITY GARDENS

IN casting about for ways and means of starting a food-garden, by all means investigate the advisability of joining up with, or inaugurating, a community garden. There are tremendous possibilities in connection with co-operative efforts in developing vacant lots and making them productive, not in the sense of the real-estate man, but as food-producing plots, designed to reduce the cost of living, and, incidentally, in many cases, to clean up and make presentable what was formerly a neighborhood eyesore.

There are many advantages to be gained by a neighborhood group combining together for gardening operations. Usually it is not difficult in most cities to find large plots of vacant land with owners who are only too glad to have them cultivated. By co-operative effort it is possible to hire a team and plow and have such plots plowed at a trifling

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expense, whereas by individual effort it is seldom possible to obtain sufficient land to warrant the expense of hiring a team for plowing, even though the plot were large enough for the team to turn around on. A community garden organization can buy garden tools, such as wheelbarrows, wheel-hoes, a sprayer, and other comparatively costly tools, which greatly facilitate the work of caring for the plot, but which it would be impossible or unwise for an individual to buy if he wished to come anywhere near making a profit on his garden. Seeds and fertilizers can be bought to much greater advantage, and more cheaply when obtained in bulk, with the added advantage that of such seeds as tomato, egg-plant, peppers and celery, one packet is usually enough for the whole organization, whereas by individual effort it would be necessary for each gardener to buy his own packet of seed, resulting in considerable waste. Waste is not to be condoned at any time, especially now when seeds of some vegetables are scarce.

I have in mind a community organization a description of which will serve to illustrate what can be done by organized effort of this kind.

A piece of land about three acres in extent

MAKING A START

was available for cultivation in this case. It was fairly good land, but had served to some extent as a dumping-ground for cellar excavations, and had a considerable amount of rubbish of one kind and another deposited upon it. The principal of an adjacent school decided that this land ought not to remain idle, so he obtained permission from the owner to use it, and then, with some other energetic people of the community, got together and started to do things. The ground was first plowed and harrowed free of charge by the city park department and the largest of the stones removed. It was then decided that the plot should be fenced, in order to keep out cats, dogs, small boys, and other undesirables, and to insure that those who raised the crops should receive the benefit. Material, consisting of two-by-four-inch posts eight feet long, chicken netting five feet wide, and a strand of barbed wire to go around the top, was bought for this purpose at a cost of about \$112. The fence was erected by volunteers in their spare time, and six padlocked gates provided, to which each plot-holder had a key. Water-pipe was laid all over the area so that the crops could be cared for in time of drought. The expense incurred for the purchase of pipe and installa-

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tion, together with that of seeds, fertilizers, and the larger garden implements, was borne by the association. The area was divided into fifty plots each $100 \times 23\frac{1}{2}$ feet. Each plot-holder was asked to keep an account of his expenses, and also of the yields obtained. The results are interesting. The average cost of each plot, including expenses incurred for fencing, seeds, fertilizer, etc., was a little over \$11; the value of the crops obtained was around \$34; giving an average profit of between \$22 and \$23.

When one considers the smallness of these plots, it must be admitted that the results were worth while, and the whole adventure is very encouraging to those who contemplate a similar enterprise. Of course no allowance was made for the cost of labor involved in preparing and caring for these plots; but to offset this one should remember that the soil was not especially good, the workers not experienced, and then one must take into account the large initial expense of fencing the land, buying tools, etc. This year the expenses will be considerably less and the yields ought to be greatly increased because of the improvement of the soil through the cultivation of the preceding year.

Other advantages of community gardens

MAKING A START

that may be mentioned are these: there is not so much danger of a plot-holder becoming tired of gardening and quitting before he has harvested his crop; community gardening fosters a spirit of healthy competition, and each gardener tries to have his plot looking a little neater, and to produce larger and better crops, than his neighbor. Furthermore, in a body of men and women associated in this way there is almost always some one who has had a garden before and to whom the novices may turn for advice.

While community gardening is undoubtedly the most economical, and, in many ways, the most pleasurable method for the home gardener to produce his crops, one should not be deterred from the attempt to grow vegetables merely because there is no opportunity to link up with an organization. The man with a back yard can grow some vegetables, provided that his soil is fairly good and his plot is open to the sunshine. Even the apartment-dweller need not despair, because in most cities it is possible to obtain the use of a plot of vacant ground, through either the municipality or some organization formed for the purpose of dealing with such situations.

III

TOOLS

IT is unnecessary to spend much money on tools for use in a small garden. The writer did very well in his home garden with nothing but an ordinary round-pointed shovel for digging purposes, a rake to pulverize the soil and make drills for seed-sowing, a scuffle-hoe for cultivating, and a garden line made from two sticks and a piece of twine. Of course there are many tools on the market that greatly facilitate cultivation and make gardening work easier, but their purchase is inadvisable unless the size of the garden and the permanency of its cultivation warrant it.

Nothing will be said as to the various types of horse-drawn or motor-driven implements. This book is written for those who have to do their gardening with hand tools or those who are limited to the hiring of just what horse-drawn tools happen to be available.

For the preparation of the soil, probably

TOOLS

the best implement is the spading-fork. It is easier to work with than a spade and in most cases is equally efficient. The spading-fork can be used for digging and, at a pinch, can be made to serve the purpose of fining the surface soil for seed-sowing. A spade is a handy tool to have, however, especially when any work is to be done in the way of making beds or forming walks.

For seed-sowing the absolute essentials are very few. A yard-stick or foot-rule for measuring the distance between the rows is useful. An even better way of accomplishing this is to divide a hoe- or rake-handle, whichever is used in seed-sowing, into feet and quarter-feet, preferably cutting in the marks with a knife. If one is limited to buying just one tool for making the drills the rake should be chosen, as it can also be used for fining the soil and for cultivating between the rows. A garden line can easily be improvised from two sticks, sharpened at one end, and a suitable length of strong twine.

When the soil is fairly loose and easily worked, a scuffle-hoe is a very satisfactory tool for cultivating the surface. On the other hand, if the ground is hard and stony the ordinary draw-hoe should be chosen. A small hand weeder, which can be obtained at a

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cost of from ten to fifty cents, is very useful for loosening the surface of the ground close to the rows of young seedlings. Look over the illustrations of these tools in a seedsman's catalogue and pick out the one most suited to your needs. With a little ingenuity, tools suitable for stirring up the surface soil can be fashioned at home from old hoop iron or stout wire fastened on wooden handles. After a season's work in the garden you will discover just what you need in this line, and will probably be able to make a tool that will give far greater satisfaction than anything you might buy.

A garden hose of sufficient length so that water can be applied all over the garden is an advantage, but not absolutely necessary. A good rubber hose costs, nowadays, about ten dollars for a length of fifty feet, and a few expenditures of this nature sadly eat into the profits of the garden. As an accessory to the hose a sprinkler throwing a fine spray, that can be left running for several hours, is very useful and desirable, especially if there is no meter attached to your water supply!

When combating insects and diseases in a small garden, a sprayer of the atomizer type holding about a quart of insecticide and costing between one and two dollars is very

TOOLS

valuable. In a garden of considerable extent, or in a community garden, insecticides and fungicides can be economically and efficiently applied by means of a compressed-air spray-pump holding three or four gallons and costing between six and eight dollars. If a large potato-patch is cultivated, a powder-distributing bellows, costing about one dollar, is useful for distributing Paris green in powder form. A powder-distributer for use in a small garden can be improvised by making a small cheese-cloth bag in which the powder is placed and distributed by shaking the bag over the plants.

Wheel-hoes varying in price from five to fifteen dollars—the price depending on the size and number of attachments—are available for expediting the work in large gardens. Some of these implements have attachments so that they may be used for marking the rows, sowing seeds in drills or hills, for raking, cultivating, and shallow plowing. These, however, are for use on large areas by professional gardeners, or to delight the connoisseur of tools.

To sum up—the tools that it is advisable for a beginner, with a garden of moderate size, to buy are: a spading-fork, an iron rake, a six-inch hoe (of either the scuffle or

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the ordinary variety), a one-quart atomizer for applying spray fluids, and a watering-can. The cost of these should not exceed three or four dollars.

Start out with a few essential tools and add others if you find that you absolutely need them.

IV

THE SITE—THE SOIL AND ITS PREPARATION

PRACTICALLY all of the vegetable crops require sunshine, and plenty of it, in order to attain their full development. Therefore, in selecting the location of your vegetable-garden (if it is possible to have any choice) choose one open to sunshine and not hemmed in by tall buildings which shut out the air. A location near big trees should be avoided, for the trees not only shade the crops, but their wide-spreading roots also rob the ground of food and moisture which the vegetables need. The ideal location for a vegetable-garden is one open to the south and sheltered from the north and west winds, but always with this provision—the soil must be of a suitable nature.

This brings us to a consideration of one of the most important factors in successful vegetable culture—that of the soil.

Soils vary a great deal in their physical

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characters and also in their chemical composition.

Sandy soils quickly dry out and warm up in the spring, and in consequence it is possible to prepare them for planting and produce crops much earlier than is the case with heavier soils. For this reason sandy soils are usually preferred by market gardeners, whose object is to get their crops on the market as soon as possible. One great objection to sandy soils is the rapidity with which they lose their moisture by drainage and evaporation. They are frequently not naturally fertile and it is necessary to apply large quantities of manure to make them profitable. They are also subject to loss of fertility by leaching. The way in which these disadvantages can be corrected will be told later.

At the other end of the scale, almost exactly opposite in every particular, are those soils in which clay predominates. Soils of this type are cold, they dry out very slowly, and as a result it is late before they can be fitted for planting. In dry seasons, because of their water-holding capacity, they are greatly to be preferred, and plants growing on them are less liable to suffer from drought. Clay soils, because of their stickiness, are

THE SITE AND SOIL

very difficult to work, and although they may be well supplied with plant food, it is sometimes unavailable because of the sticky, tenacious character of the clay which does not provide a good medium in which the roots may ramify in search of food.

Peat soils and muck lands are made up largely of decayed organic matter. They are usually deficient in minerals, but by correct management can be made to produce good crops of certain kinds of vegetables. Enormous quantities of celery and onions are successfully grown on muck soils.

The kind of soil most desired by the gardener is the happy medium that is called loam. This consists of a mixture of clay and sand in nearly equal proportions, combined with a considerable quantity of decayed organic matter. Such soils are fertile, easy to work, retentive of moisture, but sufficiently porous so that the moisture is not retained in excess. Air can penetrate such soils, a prime necessity for healthy root growth, and also necessary for the existence of bacteria which do so much in making inert plant foods soluble and available for the use of plants.

The extreme types of soil previously mentioned can be greatly improved by judicious

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treatment. It will be remembered that one of the great drawbacks to sandy soils was the readiness with which they lose their moisture. The proper treatment for this type is to add organic matter. This decays and forms humus, which binds the coarse particles together to a certain extent and increases the absorbtive and retentive properties of the soil. This organic matter is best applied in the form of decayed, or partially decayed, barnyard or stable manure. If manure is not available a good substitute can be found in leaves. These may be gathered in the fall and piled in a heap to decay. Very little decomposition will take place during the winter months in the Northern states, and for this reason leaves that have been piled in heaps for twelve months or more are to be preferred. Decay may be hastened by forking over the leaves two or three times during the summer. Although decayed leaves are better than fresh ones for mixing in with the soil, fresh leaves are better than none at all.

The owners of city gardens frequently neglect an opportunity of adding humus to their soil when they allow the leaves of street trees to be burned or carted away. The city street-cleaning department is usually only too glad to be relieved of this duty.

THE SITE AND SOIL

When it is impossible to add humus to the soil through the medium of organic manures, as is often the case in city back yards, recourse may be had to one of the many brands of prepared humus obtainable from seedsmen.

Liming is also considered to be good for sandy soils, as the lime exercises a binding influence on the coarse particles. Of course when clay is available it is good to add it, and mix thoroughly with the sand, but it is seldom that clay is present in near enough proximity to make this practice a paying proposition. Compacting sandy soils, by means of a roller on large areas, or by means of the feet in the case of small plots, is good horticultural practice.

Clay soils, like the preceding, are greatly improved by the addition of organic matter. It should be applied in the fall, in the form of strawy stable manure, and buried deeply. Leaves also are a valuable addition. Liming is good, as this causes the flocculation of the clay particles and renders the soil more open and permeable by air and water. The addition of sand, sifted coal ashes, or wood ashes serves the same purpose. Clay soils are benefited by being plowed or spaded in the fall and left rough over the winter. This

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allows the frost to penetrate more readily, resulting in the breaking up and disintegration of the clods. Another advantage of fall plowing in the case of land of this type is that by so doing it dries out more rapidly in the spring and it is possible to get your crops planted earlier.

Muck and swamp soils are frequently waterlogged, and before they will support a crop it is necessary to underdrain them; but as this is an operation that is scarcely practicable for those for whom this book is written, it will not be dealt with here. As there is always a lack of basic salts in this type of soil, liming is practised, usually to good advantage.

Those who contemplate taking over a piece of land for the purpose of growing vegetables should, if the land has not previously produced a crop, obtain the opinion of a competent gardener as to its possibilities from a gardening standpoint. Such men are usually available in every community, and as a rule are glad to help. If expert opinion is not available, the novice can form an approximate idea of its value by making careful observations in the following manner. Take notice of the vegetation growing on the plot. If it is luxuriant and consists mostly of grasses it

THE SITE AND SOIL

will probably be all right for growing vegetables. Dig holes here and there with a spade or trowel and examine the soil. If you find, an inch or two below the surface, nothing but tin cans and broken bottles it is not a safe gardening proposition. Neither should you go ahead if you find only a thin layer of topsoil, two or three inches, above the subsoil. It is usually easy to tell the difference between what is known as topsoil and subsoil. The topsoil is darker in color, due to the presence of humus, and of a finer texture. This topsoil should be at least eight inches deep to get good results. Soils which contain too many large stones should be avoided, also those which consist of only a thin layer overlying a rock ledge.

Most vegetables succeed best in a soil that is slightly alkaline, and land intended for garden use should be tested with litmus paper to discover if acid is present in excess. Take a piece of blue litmus paper and press it upon a handful of moist soil. If it turns red it indicates the presence of acid and the advisability of liming. Lime is a valuable element in the soil, as it assists in making plant foods soluble. It is best applied in the fall, spreading it over the surface and digging or plowing it in. It can also be applied in the

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spring, but in no case should it be put on so that it comes in direct contact with manure. Lime applied with manure causes ammonia to be liberated too rapidly in the form of gas, which escapes into the air, and thus much of the fertility of the manure is lost. When it is necessary to apply lime in the spring, the manure should first be dug or plowed under, and the lime then spread on the surface, and raked or harrowed in. Use about 20 pounds of air-slaked lime or 30 to 40 pounds of ground limestone to 400 square feet.

Thorough preparation of the soil is essential if best results are to be obtained. This means that the soil must be broken up and pulverized as deeply as possible. There are several reasons for this. Breaking up the soil to a good depth increases the water-holding capacity of the soil—a very important point because of the fact that plants have to take all of the food substances that they obtain from the soil in solution. It provides a greater bulk of soil in which the plant roots may ramify in search of food. The less fertile the soil the greater is the necessity for breaking it deeply to increase the area from which the roots may draw nourishment. Deep tillage encourages the roots to penetrate downward, and plants whose roots go down deeply

THE SITE AND SOIL

in the soil are less likely to suffer during dry spells.

It is well to remember, however, that although it is desirable to have the soil broken up deeply it is not a good practice to bring too much of the subsoil up to the surface in digging or plowing. In farming operations a greater depth of soil is obtained by using what is known as a subsoil plow. This implement frequently is used after the field has been plowed in the usual way and penetrates below the topsoil and breaks up the subsoil, but without disturbing their relative positions. In gardens the same result is obtained by what is called bastard trenching, of which more will be said later.

In preparing a piece of ground that has not previously been cultivated the first thing to do is to remove all large stones and rubbish that may be on the surface. If it is a large area, the work of breaking it will, of course, be done with a plow. Supposing the land is covered with a growth of sod, it is a good plan to go over it several times with a disk harrow before plowing. This will cut up the sods, cause them to decay more rapidly when they are turned under, and insure the soil being pulverized throughout its whole depth. After plowing, harrowing is necessary to break the

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lumps and to compact the soil somewhat. The fining process can then be completed by hand, using a rake for the purpose.

Small areas can be prepared for planting by digging with a spade or spading-fork. A trench should first be dug a foot or eighteen inches wide and a foot deep, provided that the topsoil extends that far. The soil from this trench should be placed on one side so as to be available for filling in the last trench when digging is finished. Having opened the first trench, proceed with the digging, turning each spadeful of soil bottom up in the trench. The soil can be turned over with greater ease and more efficiently by always maintaining a trench when digging. It is the only way by which sods, manure, and weeds may be properly buried so that they may decay and form plant food.

Bastard trenching is carried out in the same way as digging except that the trench is made at least two feet wide and the subsoil thus exposed is broken up with a spading-fork before the topsoil from the next trench is turned over upon it.

When digging, the soil should be broken up as finely as possible with the spade or fork, so as to leave no lumps, and all large stones should be thrown out.

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Digging or plowing should never be attempted when the ground is frozen or when it is so wet that the soil sticks to the tools used.

After the soil has been turned over and broken up the rake should come into operation and the surface fined so as to fit it for seed-sowing.

V

FERTILIZERS

THE most important elements that it is necessary to apply to the soil in the form of fertilizer are nitrogen, phosphorus, and potash.

Nitrogen greatly stimulates the production of leaves, and an excess of it applied to crops grown for their fruit or roots is undesirable. It is contained in all the animal manures, associated with other fertilizing elements, and in a practically pure state in nitrate of soda.

Phosphorus is a valuable and necessary fertilizer which has a great influence on the production of fruits and seeds. It is found in greater or less quantities in animal manures, and in bone meal. Phosphatic rock that has been treated with acid is another important source of phosphorus.

Potash. The rôle of potash in the soil is similar to that of phosphoric acid. It is con-

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sidered to be a valuable fertilizer for all crops that are grown for their roots. It occurs in animal manures and in wood ashes. Muriate of potash and kainite contain potash in a more concentrated form, but are difficult to obtain at present.

All of these three elements must be present in the soil for the production of healthy crops.

It is generally conceded that the best all-round fertilizer for plants is decayed *barnyard* or *stable manure*. It not only adds fertility to the soil, but by its decay it helps to make the mineral particles soluble and thus available as plant foods. As already indicated, it also improves the physical condition of the soil, making sandy soils more retentive of moisture, and rendering clay soils more porous. When applied in the spring it should be decayed or partly decayed, as in this condition it is immediately available for the use of the crop. If it is put on the ground in the fall, fresh manure may be used and plowed under. By the time that the planting season arrives it will be sufficiently decayed. If there is no objection on the score of appearances, stable manure, either fresh or decayed, may be applied in the form of a thin mulch (a layer on the surface of the ground) at any time when the plants are

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growing. The fertility is gradually washed down into the soil by rain, and a loose covering of this kind is of additional advantage in that it helps to prevent the loss of water from the soil by evaporation. This mulch must *not* be worked into the soil so that it comes in contact with the plant roots, but should be left on the surface until it is dug under the following fall or spring. Discretion must be exercised in its use. Root crops, that are already growing luxuriantly, such as beets or carrots, or crops that are grown for their fruit, such as beans and tomatoes, would probably be harmed by a surface dressing of this kind. Barn-yard manure is rich in nitrogen, which is a great stimulant of leaf growth. If it is applied too freely to the crops just mentioned it is likely to result in an excessive crop of leaves at the expense of roots or fruit.

A dressing of stable manure two or three inches thick all over the plot or at the rate of from three to five hundred pounds to a plot twenty by twenty feet is about the right quantity to use when the ground is dug or plowed.

Sheep manure is perhaps the next in importance of the organic manures and is more concentrated than barn-yard or stable ma-

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nure. It can be applied at the rate of forty pounds to four hundred square feet. It is better to spread it over the surface immediately after the ground has been broken up, and thoroughly mix it with the surface soil by means of a rake or harrow.

Hen manure is still more concentrated and should be used in the same way, or as a top-dressing after the crops have started their growth. Twenty pounds to four hundred square feet is a suitable amount to apply. To facilitate its distribution it should be mixed with dry earth and kept in a dry place for a few weeks before it is desired to apply it.

Of the so-called *chemical fertilizers*, those that are sold by seedsmen as "complete" fertilizers are the best for the amateur to buy. These at the present time are usually made up in the proportion of 5 per cent. nitrogen, 8 per cent. phosphorus, and 1 per cent. potash. Use twelve pounds to four hundred square feet.

All of the preceding are "complete" fertilizers containing nitrogen, phosphorus, and potash in varying proportions. If they are used in combination the quantities must be reduced.

Bone meal is a fertilizer which contains phosphorus and nitrogen. In some of its

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forms it is rather slow acting and sometimes does not become fully available for the use of the crop until the year succeeding its application. Use twelve pounds to four hundred square feet.

Nitrate of soda is the quickest-acting fertilizer that we have and is very valuable for stimulating the growth of plants early in the spring, when the nitrogen content of the soil is usually low. It is especially suitable for those crops that are grown for their leaves, such as spinach, lettuce, and cabbage. Great care must be exercised in the use of this fertilizer, as an overdose will injure or kill the plants. As it is very soluble, it should not be applied until the plants are up and ready to use it, otherwise much of it will be washed out of the soil and wasted. It should be sprinkled on the surface of the soil, first crushing the lumps, and then mixed in with a hoe or cultivator. An ounce to each square yard, applied at intervals of about three weeks, until the crops have a good start, is the right proportion to use. It is impossible to lay too much emphasis on the necessity for care in the use of this fertilizer. It must not be allowed to come in contact with the leaves of the crop, or it will cause them to burn and turn brown. Generally speaking, it is not a

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good fertilizer to use on root or fruit crops, although it can be used to good advantage in helping young plants of tomato, cucumber, muskmelon, etc., to get a start just after they have been planted out. Its use later in the season is likely to result in the production of leaves at the expense of fruit.

Wood ashes contain potash and lime. This fertilizer is a valuable dressing for heavy, clayey soils, as it improves their physical condition. It is good for root crops, such as beets, carrots, radishes, etc. Use twenty pounds to four hundred square feet.

It is best to apply all concentrated fertilizers as surface dressings, and then harrow or rake them into the soil, rather than to plow or dig them under.

If it so happens that the soil is not very fertile and there is only a limited quantity of fertilizer available, it is a good plan, instead of spreading it all over the plot, to apply it only in close proximity to the hills or drills in which the plants are growing.

It is important to remember that the greatest good can only be obtained from chemical fertilizers when the soil is plentifully supplied with humus.

VI

THE KINDS OF VEGETABLES TO GROW

A NUMBER of factors have to be taken into consideration before deciding just which kinds of vegetables to plant in your garden. Some of these factors are, the nature of the soil, the size of the garden, the food value of the crop and the ease with which it may be stored for winter use.

Sometimes it is possible to adapt the soil to the crop, but usually it is easier to adapt the crop to the soil. A rich loam will support practically all of the vegetables and produce good crops. A thin, sandy soil which has not been properly fertilized is only suitable for such crops as bush beans, beets, Swiss chard, tomato, and New Zealand spinach. Of course other crops can be grown on such a soil, but not very satisfactorily. Potatoes like a sandy soil, but it must be well fertilized.

KINDS OF VEGETABLES

Heavy clay soils will grow cabbage, kale, corn, parsley, parsnips (if the soil is deep), peas and rhubarb.

If the soil is shallow it is not advisable to attempt any of the root crops that make a long root. In this category belong the long beets, parsnips, and salsify.

That person is unwise who attempts to grow potatoes, corn, and cabbage in a very restricted area. These crops need plenty of room in which to develop, and when one has only a city back yard, or a small plot, it is better to concentrate on the smaller-growing vegetables. The best crops to grow in the city back yard are bush beans, parsley, radish, beets, Swiss chard, and tomato. Peas would probably succeed if it were not for the sparrows which pick off the leaves as fast as they are produced.

One is strictly limited if the available ground is shaded. All the vegetables need sun for the greater part of the day. Those kinds which are grown for their leaves are more satisfactory in a shady garden, and if the soil conditions are favorable the following may be tried: beet, cabbage, lettuce, and Swiss chard. Even these need a few hours of sunshine.

Those who are interested in dietetics may

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wish to choose their vegetables on the basis of their food value. In terms of the calorie, the unit of energy as applied to food, we find that 1 ounce of dried beans (seeds) and 8 ounces of string-beans are required to produce a hundred calories. Of green corn 3.2 ounces are needed; of potatoes, 5.3 ounces; of onions, 8 ounces; of beets, 9.6 ounces; of cabbage, 13.3 ounces; and at the bottom of the list comes celery, of which 23.7 ounces are required to produce a hundred calories. It is misleading, however, to take a list of vegetables with their caloric values and decide, that because 6.4 ounces of peas contain one hundred calories, while it is necessary to have 10.1 ounces of carrots to produce the same amount, nothing but peas shall be grown in the garden. The proper basis on which to make a decision along these lines is on the amount of calories that can be obtained from each square yard of ground. A considerable area is necessary for the production of a pound of peas, while a similar weight of carrots could be produced in a much smaller space. Furthermore, it must be remembered that the human system demands a certain amount of bulky foods, and these are supplied by vegetables low in caloric values.

KINDS OF VEGETABLES

There are a number of crops that can easily be preserved or stored for winter use, and this should be considered when deciding what kinds of vegetables to grow. String-beans are easily preserved by pickling them in brine, and there is no difficulty whatever in caring for the dry-shell beans when they are not infested with weevils. All of the root crops—carrots, beets, parsnips—can be easily stored in sand or soil in the cellar, and potatoes are one of the easiest of crops to care for. Onions can readily be carried over into the winter if a cool, airy room is available. All of the crops just mentioned are fairly high in food value.

VII

PLANNING THE GARDEN

A GARDEN can be made without a plan, but it is usually a haphazard sort of affair, and it frequently means that much more money is spent for seeds than is necessary. Another frequent happening in a miss-or-hit garden of this kind is a plethora of some kinds of vegetables and a great scarcity of others.

It is difficult to give any definite information as to the quantities of vegetables to grow, as yields vary so much, owing to the character of the soil and climate, the variety of the vegetable, and the skill, or lack of it, of the gardener. The preferences of the individual must also be considered. The table in the Appendix giving the approximate amount of vegetables that can be obtained from a hundred-foot row may be helpful. It must be remembered, how-

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ever, that these figures are only approximate and that wide variations can be expected.

When planning your garden you must take into consideration the sunshine it receives, and if part of it is shaded reserve that part for those crops that will endure shade. If there is any variation in the nature of the soil, whether in regard to its physical condition, fertility, or wetness, you should place the crops accordingly.

As a general rule the rows should run north and south, as by this plan each row receives its share of sunlight. If for any reason this is not practicable, put the tall-growing crops at the north end of the plot, so that they do not shade the smaller kinds. The perennial crops, like asparagus and rhubarb, are best placed at one end or side of the plot so that they are not in the way when digging or plowing is being done. It makes a better-looking plot if those vegetables which are planted the same distance apart are grouped together.

Plan to have the ground occupied for the whole season. Many vegetables take a comparatively short time in which to mature, and these can be removed when harvested and the ground occupied by another crop. Thus peas can be followed by cauliflower or cabbage, early beets by beans, lettuce by tomato,

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and so on. Find out the average number of growing-days in your locality and consult the table in the Appendix giving the number of days required to bring the various crops to maturity.

When planning for succession vegetables, have some regard to crop rotation. That is to say, if the ground in the early part of the season has been occupied by a leaf crop, follow it by a fruit crop, or *vice versa*. Early cabbage followed by beans may be cited as an example. Similarly, root crops may be followed by leaf crops, as early carrots and fall spinach.

Another important reason for crop rotation is that it lessens the danger of loss from disease. Many of the fungous diseases of plants are carried over from year to year in the soil. Some of them are able to live on only one particular host plant, and if that crop is not grown in the soil where the fungus is hibernating the disease ultimately dies out through lack of food.

The first thing to do in planning a vegetable-garden is to measure the plot and transfer its outlines to scale on paper. Then, bearing in mind the considerations just outlined in this chapter, decide on the kinds of vegetables you wish to grow. Now the real

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fun of planning begins! The desires of the grower as to quantities and variety of vegetables must be scaled down so as to fit the plot. Take a ruler and draw lines across your plan to represent the rows of vegetables. The distance between the rows may be drawn to scale to correspond with the actual distance between the rows on the ground,¹ or you may merely note the theoretical distance between the lines. Write the name of the vegetable on each line, with that of the succession crop, if any. It is a good idea to mount your plan on stiff cardboard when finished, and to allow a space either at the side or on the back for making notes to be taken during the growing-season. These notes may consist of reminders that such and such a crop is not suited in its present location, the time occupied from seed-sowing to maturity, the desirability or otherwise of certain vegetables, etc.

¹ See Appendix—Table III.

VIII

SEEDS, SEED-SOWING, AND TRANSPLANTING

MOST seeds, with the exception of carrot, onion, parsnip, and parsley, will grow fairly satisfactorily even if they are more than one year old, so that left-overs from the preceding year may be planted with good results. Before using these left-over seeds, however, it is wise to test their germinating power before committing them to the garden. To plant seeds which will not germinate is a waste of time and labor. Testing the viability of seeds is a simple and easy matter and very advisable if there is any doubt. Count out fifty or one hundred seeds of the kind that you wish to test and plant them in sand or earth in a cigar-box or something similar. Place them in a fairly warm room (temperature about 60°) and keep the soil moist. In a week or two take note of the number which have sprouted, and this will give you the percentage of good seeds and

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some idea of the quantity you will have to plant in order to get a good stand. For instance, if only 50 per cent. of the seeds germinate it means that it will be necessary to plant double the usual number to make sure of having a sufficient number of plants. Another and less messy way of testing seeds is to place them on a plate between blotters or cloth, which must be kept moist, covering them with another plate to prevent too rapid evaporation of moisture. Although they adequately furnish the desired information, neither of these methods of testing seeds gives an absolutely accurate indication of what will take place when they are planted in the garden. Seeds out of doors are exposed to a number of hazards that are not present under indoor conditions.

Before planting any seeds outdoors the soil must be in the proper condition. It must not be so wet that it sticks to the tools used, the surface must be finely pulverized with a rake, and all large stones taken off.

There are three ways of planting seeds outdoors—in drills, in hills, and broadcast. The *drills* consist of shallow trenches from one-half inch to two inches deep, in which the seeds are sown. The young plants are later thinned out so that they stand an equal distance apart.

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Seeds are said to be planted in *hills* when they are sown in such a way that the resultant plants are in groups of three or more standing the same distance in the rows as the distance between the rows.

Broadcast sowing is when the seeds are scattered over the surface of the ground and covered by raking them in, or by sprinkling soil over them.

A garden line should always be stretched across the plot as a guide when making the drills. This insures straight rows, resulting in an enhanced appearance of the garden and greater ease in subsequent cultivation. A variety of tools can be used for making the drills or furrows. For those seeds which require to be planted deeply,¹ a draw-hoe is a useful tool, or, if this is not available, the corner of a rake will suffice. The shallow drills can be made with a hoe or rake handle or with a pointed stick.

The seeds should be planted immediately after the drill is made, before the soil dries up. Consult the table in the Appendix showing the quantity of seed required to plant a row one hundred feet long, and refrain from planting too thickly. Being too liberal with seeds

¹ See Appendix, Table III, for the depth to plant various seeds.

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at planting-time is not only wasteful, but also involves a great deal of extra labor later on when the young seedlings have to be thinned in order to give them room for proper development. Sow the seeds as evenly as possible and cover by raking the soil over them. The soil over the seeds must be firmed. In the case of the larger seeds, such as peas and beans, this can be done by walking along the row. The earth over the smaller seeds is best compacted by means of the back of a hoe or rake. This firming process is carried out in order that the earth may come in close contact with the seeds, so that they may absorb the moisture contained in it; also to establish capillary action with the soil below, resulting in moisture being drawn up to the surface.

There is a tendency among beginners to plant their seeds either on raised ridges or, sometimes at the other extreme, in deep trenches. The first method is liable to result in the plants suffering from drought, and the latter in flooding, if it happens to be a wet season. There are times when it is advisable to make use of these practices, as will be described when the methods of cultivation are taken up in detail, but speaking generally, level cultivation is best.

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After the seeds are planted we are enabled to sit back and have a breathing-spell until the young plants appear, when it is necessary to proceed with thinning and cultivating as described in the following chapter.

It is the common practice, in connection with some crops, not to plant the seeds directly where they are to mature, but to sow them elsewhere at first and to transplant the young plants to their permanent quarters later.

In the Northern states the growing-season is not sufficiently long to get best results from such tropical plants as tomato, egg-plant and pepper if the seeds are sown outside. A longer growing-season is afforded to these plants by raising them in a greenhouse or hotbed, and transplanting them to the garden when the earth has warmed up and danger of frost is over.

Cabbage is transplanted for the reason that if the seed was sown directly in the field it would be necessary to plant much more seed than was actually needed, and because the ground can be profitably occupied with another crop while the young cabbage plants are reaching a sizable condition. Early cabbage is also sown in a greenhouse or cold-frame in order to hasten the time of maturity.

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Although it is possible to raise these transplanted crops with no other facilities than those provided by the ordinary dwelling-house, it is not worth while when only a few plants are required. Young plants of tomato, egg-plant, pepper, and cabbage can be obtained at such a trifling expense from seedsmen who make a business of raising them that it does not pay to bother with raising them yourself.

An eye should be given to weather conditions when transplanting. The plants will feel the check less if a cloudy, humid day is chosen on which to do the work. The soil should be moist, but not so wet as to be sticky. The hole for the reception of the roots can conveniently be made with a trowel. Make it large enough so that the roots may be spread out and then press the earth gently but firmly around them. If the soil is dry leave a shallow depression around the stem of each plant to facilitate watering. Sufficient water should be applied to soak the ground for a depth of six inches or more, and when it has drained away from the surface, the depression may be filled with loose dry earth to prevent the moisture escaping by evaporation.

If for any reason it is necessary to do the

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work of transplanting on a dry, sunny day, the young plants should be shaded. This can be accomplished by covering them with inverted flower-pots, or with newspapers weighted at the corners with stones to keep them from blowing away, or a shingle or thin piece of board may be stuck in the ground on the sunny side so that its shadow falls on the plant.

In most cases, unless they are grown in earthen or paper pots, the root system of the plants is injured in transplanting. In order to restore the balance between root and shoot it is advisable, and customary, to cut off part of the leaves. If the whole of the leaves are left on the plant they wilt and sometimes die because the reduced number of roots is unable to supply their demands for moisture.

IX

HOEING AND THINNING

WHEN the young plants appear above the ground it is time to commence cultivating. This consists of breaking up and pulverizing the surface crust. There are several reasons for doing this. It allows air to enter the soil, which, it will be remembered, is a necessity for the roots of plants and has an important bearing on the formation of plant food. It keeps down the weeds, and, most important of all, it helps to conserve the moisture in the soil.

All who have had anything to do with the cultivation of the soil will have noticed that when its surface is stirred up after a rain it quickly dries out. It will also have been noticed that, if any one has walked over this soil just after it has been stirred up, the soil in the footprints remains moist. Why is this? It is simply that capillary action has been broken by the loosening of the surface, and

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the soil-water rises to the loosened soil and no farther. On the other hand, capillary action has been restored in those places where the soil has been compacted by walking on it, and the surface here is moist because moisture is continually being supplied from the store below. This moisture just as continually evaporates during dry weather and is lost as far as the plant roots are concerned.

Breaking up the surface soil provides a dust mulch or soil blanket which shades the moist soil below from the sun's rays, and in a large measure prevents evaporation. Therefore, after every rain, just as soon as the soil has dried out sufficiently so that it does not stick to the tool used, the surface should be cultivated.

Various tools are used for this purpose. When working close to young plants the small hand weeders are useful. Between the rows a hoe should be used. These are of three types. The *scuffle-hoe*, which is pushed through the soil just underneath the surface, the operator walking backward. This is a handy tool for small gardens if the soil is not too hard, and its use gives the advantage of it not being necessary to walk on the loosened soil.

The ordinary *draw-hoe* is used with a

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chopping motion and the operator walks forward over the loosened soil. It is a good tool for getting rid of weeds, and is better than the preceding for use in hard or stony ground.

There are many forms of *wheel-hoes* which enable the work of cultivating to be done very expeditiously. They are pushed forward with a jerky motion, one step at a time, pulling the implement toward you before making the forward thrust, thus gaining momentum before the teeth enter the ground. Do not attempt to push a wheel-hoe in the same way that you would a perambulator—it's too hard work.

To water or not to water is sometimes a debatable point in vegetable-growing. There is this much to be said about the application of water to the garden. If thorough cultivation has been properly attended to there will be much less need of watering, and when it is decided that watering is necessary, let it be thorough, so that the soil is soaked to a depth of a foot or so. Then as soon as the soil has dried out somewhat, stir up the surface so that the moisture is not lost by evaporation. The best way to apply water is by means of a sprinkler, throwing a fine spray, which can be left operating for two or three hours.

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This insures a proper wetting of the soil without washing away any of the loose soil on the surface. The next best thing is to use a hose. The watering-pot is of little use except in a very small garden, because one gets tired of toting water before the plants have been given nearly enough.

In order to obtain good crops it is necessary to allow the plants sufficient room to attain their full development. They must have space in the earth for their roots to ramify in search of food, and room above to spread their leaves to the air and sunshine. A number of seeds, including beet, carrot, corn, lettuce, onion, parsnip, radish, spinach, and Swiss chard, are sown in such a way (in order to insure a good stand) that when they germinate the young plants stand too close together. These have to be thinned out.¹ This operation should be carried out as soon as the seedlings are large enough to handle. Choose a cloudy day when the soil is fairly moist, and pull out the weak, spindly plants, leaving the strong, healthy ones.

¹ See Appendix, Table III, for distance these plants should stand apart.

X

STAKING AND TYING

SOME of our vegetable crops need supports of some kind to obtain best results from them. Peas, and beans of some varieties, and tomatoes are of this nature.

The dwarf peas, which need no supports, are the best for the small garden, but if the taller kinds, which are more productive, are grown it is necessary to supply them with something on which to climb. Twiggy brushwood is the best for the purpose, as the pea tendrils attach themselves readily to this. The bases of the branches should be sharpened with a knife and then stuck firmly into the ground on either side of the row when the peas are a few inches high. Chicken netting stretched along the row and supported on strong stakes is also suitable.

Pole beans climb by means of twining, and poles from six to eight feet high and about two inches in diameter are usually supplied

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for them. These poles are inserted in the ground by first making a hole with a crowbar. Another method of supporting beans is by means of V-shaped frames about six feet high and three feet wide at the bottom. They can be made of light lumber, such as three by one or two by two inch rough pine. These are spaced from eight to ten feet apart and connected by thin strips of lumber along the top and along the bases. Strings are fastened on one of the base strips, carried over the top and fastened to the base strip on the other side. These strings should be from six to nine inches apart. The beans are planted so that there is one bean-plant to each string.

Tomatoes may be left to grow naturally, in which case they sprawl over the ground and much fruit is spoiled by coming in contact with the earth, or they may be staked. If grown to a single stem each plant will need a stout stake to which it may be attached by tying with pieces of cloth or tape about an inch wide. If twine were used it would probably cut into and injure the soft stems. Another way of supporting tomatoes is to allow all the shoots to grow at will, but to prevent them from falling on the ground by placing around each plant three or four stakes connected with barrel hoops or with twine.

XI

INSECT ENEMIES

TO be successful in controlling insect pests, preventive or remedial measures must be applied early. If spraying is deferred until insects infest the plants in large numbers, great difficulty is experienced in getting rid of them. It is emphatically much easier to kill a few insects than a whole host. If they are once allowed to obtain the upper hand, the crop will be so much injured that it frequently will not pay to attempt to save it.

The important point that must be grasped in connection with the control of insect pests is that they may, from the point of view of the gardener, be divided into two groups—"biting" insects and "sucking" insects.

The biting insects *eat* the leaves, roots, or stems of the plants attacked, and their presence is usually obvious even to a casual observer.

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The sucking insects obtain their food, not by eating the leaves, but by inserting their "beaks" into the plant tissue and sucking its juices. Since it is not feasible to poison the sap of plants to kill the insects, the best method is to spray them with what are known as "contact" insecticides. These must be applied in such a way that they actually come in contact with the insects. Soap solutions, kerosene emulsion, and nicotine are the principal contact sprays.

Sometimes, instead of using sprays it is more convenient to use dry insecticides in the form of powder. This is particularly the case when a spray-pump is unavailable or the water supply not close at hand.

No matter in what form these insecticides are applied, the operation must be done thoroughly or little benefit will result. The contact sprays should be applied with force in such a way that every insect is covered. To apply the stomach poisons a fine, mist-like spray should be used which will coat the leaves with a thin film of poison. If too much is applied there is a tendency for the mixture to run into globules, which concentrates the poison at the tip of the leaves. This may result in injury to the plants and is not effective in coating the whole of the leaves.

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The feeding habits of some insects make it almost impossible to control them by spraying; so traps, poison bait, hand picking, repellents, or screening the plants to prevent access of insects are resorted to. These measures are fully described in connection with the insects against which they are used. Following are some of the more important insect pests.

BEETS.—*Flea-beetles* (small, very active insects, as indicated by their name), *blister-beetles*, and various caterpillars, which eat the leaves, attack beets. Lead arsenate¹ should be applied as soon as the injury is noticed.

CABBAGE.—Probably the worst insect pest of this crop is the *cabbage-worm*, a green caterpillar which hatches from eggs laid on the leaves by the common white butterflies, which may be seen flitting about the garden from early spring until fall. Spraying the plants with arsenate of lead to which a "sticker" has been added to make it adhere to the leaves is a standard remedy. Cabbage is also attacked by flea-beetles and caterpillars of various kinds, which are controlled by the same methods adopted for the cabbage-worm.

CAULIFLOWER.—Same pests as cabbage.

¹ Various spray formulas will be found at end of chapter.

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CORN.—The *corn earworm* is one of the worst of the pests attacking corn. This is a caterpillar which at first feeds on the “silk” and later penetrates the ear and eats the kernels. It is very difficult to control this insect. Lead arsenate sprayed or dusted on the silk as soon as it appears is a partial remedy.

CUCUMBER.—The *striped cucumber-beetle* is about a fourth of an inch in length, yellow in color, with three black stripes on the wing covers. It eats the leaves of the young plants and if unchecked ruins the chances of obtaining a crop. One of the best ways of dealing with this insect is to prevent it from gaining access to the plants by the use of cheese-cloth or wire mosquito-netting screens. These can be made by tacking the material used over bottomless boxes, not so high as to shade the plants, but of sufficient width and length to give them room to grow. Another method is to place two or three short sticks in the center of the hill and over these spread a “tent” of cheese-cloth, holding down the edges with stones and earth. Tobacco dust sprinkled plentifully over and around the plants acts as a repellent.

The *twelve-spotted cucumber-beetle* may be controlled by the same measures and by spraying with lead arsenate.

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EGG-PLANT is subject to the same pests as the potato.

KALE and KOHLRABI are attacked by the same insects that attack cabbage.

MUSKMELON is subject to the same insects as the cucumber.

ONION.—*Thrips* is a tiny insect which infests onions, sucks the sap from the leaves, and causes them to assume a silvery appearance. Most vegetables are subject to its attack. It can be controlled by using a contact spray, such as nicotine solution or kerosene emulsion.

POTATO.—The most troublesome insect pest of the potato is the well-known *Colorado potato-beetle*. This may be controlled by picking the insects from the plant by hand, or by dusting the leaves with Paris green which has been diluted by mixing it with fifty times its bulk of air-slaked lime. Spraying the plants with lead arsenate is even more effective.

The *flea-beetle* eats small holes in the leaves, making them appear as if they had been riddled with shot. The spray treatment adopted for the *Colorado beetle* will also take care of them.

Blister-beetles are slender insects varied in color which attack potatoes and many

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other vegetables. Lead arsenate is the best remedy.

PUMPKIN is likely to be affected with the same pests as cucumber and squash.

SQUASH.—This crop is subject to the same pests as cucumber. The *squash-bug*, or *stink-bug* (which also attacks cucumbers and melons), is grayish-brown in color and about three-fourths of an inch long. It exhales a very offensive odor which makes hand picking, one of the most effective means of controlling it, an extremely unpleasant task. The measures adopted against the *cucumber-beetles* are also effective in controlling this pest. Other remedies that may be tried are the collection and destruction of the conspicuous eggs which are to be found in masses on the under sides of the leaves, and trapping the adults by placing shingles on the ground around the plants. The insects will congregate under these and can then be destroyed by stepping on them.

TOMATO.—The *tomato-worm*, the larva of a Sphinx-moth, sometimes occasions much damage. Hand picking is a good remedy, or the plants may be sprayed with lead arsenate. If the latter course is followed, care must be taken to clean the tomatoes thoroughly before eating them. The tomato is also

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subject to the same insect pests as the potato.

WATERMELON is attacked by the same insects that infest cucumbers.

Practically all vegetable crops are subject to attack by the following insects:

APHIS, or PLANT LICE.—These occur in both small and large species in a great variety of color. They injure the plants by sucking their juices, and frequently cause the leaves to become curled and deformed. Usually these insects are to be found on the soft growing tips of the plants or on the under sides of the leaves. Prompt application of remedial measures is necessary. The green-colored forms are usually the easiest to kill, and a simple soap solution is generally effective. The black *aphids* are more tenacious of life, and a stronger insecticide must be used, such as nicotine solution or kerosene emulsion.

CUTWORMS are the larvæ of several species of moths. They are especially partial to beans, cabbage, corn, onions, and tomatoes. They are usually dark-colored, greasy-looking caterpillars which spend most of their time, when they are not eating, just underneath the surface of the ground. They cut off the plants by eating through the stems. Several different measures should be in operation at

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the same time to rid a garden of *cutworms*. One of the most effective is the use of poisoned bait, but this is not advisable when live stock have access to the garden. The bait should be strewed liberally close to the plants. Shingles or thin boards may be placed on the surface of the soil. The *cutworms* will congregate under these and can then be killed by any means that suggests itself. Hunting for them at night, when they are feeding, with a lantern or flashlight, is another method of reducing their numbers.

Two very important soil pests are *white grubs* and *wireworms*. They attack potatoes and the roots of many garden crops. The former are large, clumsy, white grubs, the larvæ of the June beetle. *Wireworms* are long, slender, shining grubs, which may be of any color from light yellow to dark brown. They are the larvæ of click-beetles. It is very difficult to control these pests. Frequent, deep tilling of the soil is probably the best remedy. If chickens are allowed access to the garden plot when it is being plowed or spaded they will eat a great many of them. *Wireworms* may be trapped by attracting them to buried pieces of carrot or potato. These traps must be examined every morning and the insects congregated on them killed.

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Following are the formulas for the various insecticides recommended.

STOMACH POISONS FOR BITING INSECTS

Lead-arsenate Solution

1 oz. lead arsenate (paste) to 1 gal. of water
or
 $\frac{1}{2}$ " " " (dry) " " " " "

This can also be obtained as a fine powder for dusting upon the plants. This method is less economical of material.

Paris Green

$\frac{1}{2}$ oz. Paris green }
 $1\frac{1}{2}$ " lime } to 3 gal. of water

When using Paris green as a powder it is advisable to dilute it with from twenty-five to fifty times its bulk of air-slaked lime. This acts as a carrier and renders it possible to distribute the poison more economically and effectively. It is inadvisable to use these poisons, Paris green and arsenate of lead, on heading cabbages or vegetables that are shortly to be eaten, as there is some danger of poisoning the consumers.

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Pyrethrum Powder

1 oz. pyrethrum to 2 gal. of water

Can also be applied as a powder. It is a good insecticide for use on vegetables that are shortly to be eaten, as there is no danger of poisoning human beings by its use. Can also be used as a contact spray.

Hellebore Powder

2 oz. hellebore to 1 gal. of water

The hellebore should first be boiled in water and then diluted to make one gallon. It is very similar in its action to pyrethrum.

CONTACT INSECTICIDES FOR SUCKING INSECTS

Soap Solution

2 oz. laundry soap to 1 gal. of water

Nicotine Solution

$\frac{1}{2}$ oz. 40% nicotine } to 3 gal. of water
1 " soap

The soap is added to this solution to assist in spreading the mixture and to make it come in close contact with the insects.

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Resin Fish-oil Soap

Is recommended by U. S. Department of Agriculture to be added to contact sprays and fungicides, to act as a "sticker" when they are to be used on crops with smooth leaves to which the spray will not stick.

Use two ounces to three gallons of spray mixture.

POISON BAIT FOR CUTWORMS

3 lbs. wheat bran
2 oz. white arsenic or powdered lead arsenate
 $\frac{1}{2}$ pint cheap molasses

Mix all together and add enough water to make a mash that will stick together. This is very poisonous and extreme care must be exercised in its use.

XII

PLANT DISEASES

MOST of our vegetable crops are subject to attack by fungus or bacterial parasites which cause disease. Preventive measures are the most important in combating ills of this nature. These may consist of providing unfavorable soil conditions for the disease, as in the case of cabbage clubroot, or disinfection of the "seed" as practised for the control of scab of potatoes. Other measures are: the application of protective sprays, which kill the spores of disease organisms when they germinate; rotation of crops; planting disease-resistant varieties; and the avoidance of material carrying spores of disease, such as manure containing parts of diseased plants.

Bordeaux mixture is the standard fungicide. The formula which calls for four ounces lump lime, four ounces copper sulphate (bluestone) and three gallons of water is the one most commonly used.

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It is made by dissolving four ounces of bluestone in an earthenware or wooden vessel in one and one-half gallons of water. The lime is slaked in another vessel by adding water gradually until it forms a mixture of a milky consistency. Add more water to make one and one-half gallons and strain through cheese-cloth. After it has been strained it should be thoroughly mixed with the copper-sulphate solution and used immediately. Bordeaux mixture made in this way will not keep, but should be applied the same day. Stock solutions of copper sulphate and lime will keep indefinitely if they are not mixed together.

Liver of sulphur (*potassium sulphide*) is valuable for spraying plants affected with mildew. Use one ounce dissolved in three gallons of water. This solution discolors paint.

The following are some of the common diseases affecting vegetable crops:

BEANS are attacked by *anthracnose*. It causes dark-colored, sunken spots to appear on the leaves, stems, and pods. It frequently penetrates to the seeds. Infected seeds should never be planted. It pays to look over all beans that are to be used for seed and destroy all that are discolored.

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Never work among the bean-plants when they are wet, as the disease, if it is present, is easily spread by this means.

BEETS are subject to a *leaf-spot*. This causes small, round, dead spots to appear on the leaves. Bordeaux mixture applied as soon as the spots appear and at intervals of one or two weeks will check this disease.

CABBAGE.—*Clubroot* is a disease which causes the roots of cabbage, cauliflower, kohlrabi, and allied plants to become swollen and deformed, and prevents them from functioning properly. If it is not noticed at transplanting-time the first indication of its presence is the sudden wilting of the plants. All affected plants should be destroyed. The seedbed and that part of the garden where the cabbages are to be planted should be limed two or three months before planting. Use between fifty and sixty pounds of air-slaked lime on a plot twenty by twenty feet, and thoroughly mix it with the soil.

CORN.—*Corn smut* usually appears as swellings, covered with a silvery membrane, on the tassels or ears. These break open later and disclose the masses of dark-colored spores. The swellings should be cut off and destroyed before they burst.

CUCUMBER.—*Anthracnose*, *angular leaf-*

PLANT DISEASES

spot, and *downy mildew* are diseases attacking the leaves of cucumbers which can be controlled to some extent by frequent spraying with Bordeaux mixture. This should be applied as soon as the diseases are noticed and repeated at intervals of one or two weeks.

PEAS are affected by a *mildew* which shows itself on the leaves and pods as a whitish mold. The plants should be dusted with powdered sulphur, or sprayed with potassium-sulphide solution to which resin fish-oil soap has been added to make it stick to the leaves.

POTATO.—Two important diseases affecting potatoes are *scab* and *late blight*. The former is a disease which lives in the soil and is also carried over on infected potatoes. It shows itself as scabby spots on the tubers. Seed potatoes can be disinfected by soaking them, before they are cut, for two hours in a solution of one part Formalin to two hundred and forty parts water. This treatment will not prevent scab if the soil is already infected. An alkaline soil favors the growth of this disease.

Late blight appears late in the season and causes the leaves to blacken, become watery, and decay, often accompanied with an offensive odor. The disease also penetrates the tubers and renders them unfit for storage

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purposes. Spraying with Bordeaux mixture is practised as a preventive measure. It should be applied when the plants are six inches high, and repeated at intervals of about ten days until the crop is mature. Crops can be obtained without spraying, but Bordeaux mixture may be considered as a form of insurance. Lead arsenate may be added to the Bordeaux mixture if potato-beetles are present.

TOMATO.—*Tomato leaf-spot* is a disease which causes dark-brown spots to appear on the leaves. The areas attacked shrivel and die. Spray with Bordeaux mixture.

It is just as important to apply remedial or preventive measures early in the case of diseases as it is in controlling insect pests. Fine mist-like sprays should be used as recommended for applying stomach poisons, and for the same reason.

XIII

THE CULTURE OF VEGETABLES IN DETAIL

THIS chapter is devoted to hints on the cultivation of the more important vegetables, together with some mention of varieties suited for "war-garden" planting.

ARTICHOKE, JERUSALEM.—This has about the same food value as the potato, but, unfortunately, it is a rather tasteless product. Proper cooking, with the addition of sauces and condiments, will make it palatable. It is a tall, coarse-growing plant belonging to the sunflower family. If you have an out-of-the-way spot in your garden where nothing else will grow, try a few artichokes. It needs sunshine, but is not particular as to soil. It should be planted in the spring on ground that has had a dressing of barn-yard manure spaded in. Plant the tubers a foot apart in rows two feet apart. The plant is a perennial, and likely to become a troublesome weed unless restricted to one corner of the garden.

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BEANS.—This group comprises some of the most important of garden vegetables.

The various types of beans differ greatly in their requirements, and there is scarcely any kind of soil or climate that will support vegetation, where beans of one kind or another cannot be grown.

Most of the beans are very susceptible to cold and must not be planted until the soil has warmed up and all danger of frost is past. There is one kind, however, belonging to a different genus than the common beans, which is not harmed by frost and which requires a long, cool season to develop properly. This is the broad, or Windsor, bean. A rich clay loam is best suited to this plant, and the seeds must be planted just as soon as the ground is in condition to be worked on in the spring. Plant them in rows two feet apart, and three inches apart in the rows.

The ordinary garden beans can be divided into two groups—the pole beans, which can be subdivided into those of the string and Lima types; and the bush beans, comprising string-beans, green and wax podded, green-shell beans, dry-shell beans, and Limas.

The pole beans, especially the Limas, are very susceptible to cold and cannot be planted outdoors in the vicinity of New

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York until toward the end of May, and not until June if it happens to be a cool season. They require a light, fertile soil for their best development. Seeds can be planted in hills three feet apart each way, placing three or four seeds in each hill. Poles must be provided for them to climb on and these should be in place before the seeds are planted. They can also be planted and trained on a trellis, as described in Chapter X.

Bush beans of the string type are less affected by cold than the preceding, but are not very hardy in this respect. They may be planted as soon as danger of frost is past if the ground is not too cold and wet. The distance between the rows should be about eighteen inches, the plants standing from three to four inches apart in the rows. Bush beans will grow in a variety of soils ranging from those of a sandy nature to clay loams, but they grow best in sandy loam. Shell beans of the Improved Navy type (pea-beans) are especially adapted for planting in sandy soils.

Bush Lima beans require the same kind of soil as the pole beans, and should be planted at the same time. Make the rows two feet apart, with the plants from six to nine inches apart in the row.

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The following are good varieties. Of the dwarf, wax-podded kinds *Rust-proof Golden Wax* and *Burpee's Kidney* are desirable.

Bountiful, a flat-podded type, and *Valentine*, a round-podded kind, are good examples of dwarf, green snap-beans.

In the pole beans we have *Golden Carmine* and *Golden Cluster*, both wax-pods, and *Kentucky Wonder*, an excellent, green snap-bean and also suitable for providing dry-shell beans.

Of beans that are grown for their seeds the following may be noted: *Dwarf Horticultural* (can also be used as a snap-bean), *Improved Navy*, and *White Marrow*.

The Limas are represented by two forms, the dwarf and the climbing kinds. Good dwarf Limas are *Burpee's Improved*, and *Fordhook*. For planting in the Northern states, *Leviathan*, which is a quick-maturing variety, is very suitable. This and *King of the Garden*, a very productive kind, are pole, or climbing, Limas.

BEETS are one of the hardy vegetables which can be planted as soon as the ground has been prepared in the spring. There are two distinct kinds of beets—those which have a globular or flat root, and those with a long, tapering root. The latter are of slower

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growth than the round kinds, and are very suitable for winter storage, but their cultivation should not be attempted unless the soil is deep and of a sandy nature. The globe beets are the best for the home gardener. For the first planting a quick-maturing kind, such as *Crosby's Egyptian*, should be chosen. For later plantings *Detroit Dark Red* is suitable, and this is a good variety to plant toward the end of June or early July to form roots suitable for winter storage. Beets can be planted in rows from twelve to eighteen inches apart. After the seedlings have reached a height of two or three inches they should be thinned out to stand four inches apart in the row. If desired, these thinnings may be taken up carefully, so as not to break the roots, and transplanted in another part of the garden. Another plan is to defer thinning until the plants are from four to six inches in height, and then use the thinnings as "greens." Beets will grow in almost any soil, but the best crops are produced on sandy loams.

CABBAGE may be grown as an early crop, to mature around June or July, or as a late crop, to mature in the fall.

The early crop is usually produced from seeds sown in a greenhouse or hotbed in

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February or early March, the young plants being set out in April. They require plenty of room for development and should be planted so as to stand from eighteen inches to two feet apart in the rows, the rows being two and one half to three feet apart. *Early Jersey Wakefield* is the variety commonly grown for an early crop.

Seeds for the late crop can be sown in May. If sown outdoors, a plot of rich, sandy soil (a square yard will produce an ample supply of seedlings for most home gardens) should be chosen. If the plot has been limed a short time previous it is an advantage, as an alkaline soil lessens the liability to club root, a disease which prevents proper development of the cabbage. The resultant seedlings should be set out in July. As late cabbages are stronger growers and form larger heads than the early kinds, they should be given more room—three feet between the rows and two feet apart in the rows. A standard variety for late planting is *Flat Dutch*.

Cabbages will succeed in a variety of soils. but to get best results heavy applications of decayed stable manure should be incorporated with the soil before planting. Surface dressings of nitrate of soda are also beneficial.

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CARROT.—This crop can be planted any time after the ground is in condition in the spring up to July, which is a suitable time to sow seeds for the crop designed for winter storage. The quick-maturing kinds, such as *Early Scarlet Horn*, should be sown first, choosing the warmest position in the garden. These will be ready for use in a short time, when they may be harvested and the ground used for another crop. For later crops *Danver's Half-long* may be used. Carrot seed should be sown in rows a foot or fifteen inches apart and one-half inch deep. The early varieties should be thinned to stand about two inches apart, while the main crop needs about four inches between each plant. Some people defer the thinning of their carrots until they are of sufficient size for the table. "Baby" carrots are one of the most delicious of vegetables when they are properly cooked, far preferable to the roots that have been allowed to mature. While this plan has great advantages, the carrots left behind do not attain so great a size as would be the case if thinning had been attended to earlier.

A deep, well-cultivated soil is the best for this crop. In heavy soils that have not been deeply worked, the short-rooted kinds, such as *Ox-heart*, should be planted.

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CAULIFLOWER.—The cultivation of cauliflower is substantially the same as that of cabbage. It is a cool-weather crop, and not much success is likely to be obtained if attempts are made to mature it during hot weather. For this reason it is either planted early, or as late as possible consistent with the prospects of maturing the crop. It requires a light, rich soil. When the heads begin to form, it is advisable to bend the outside leaves over and fasten them in such a way that the head is shaded from the sun. Cauliflower is emphatically not a crop for the novice.

CELERY.—There are two distinct kinds of celery—the so-called “self-blanching” varieties, and the green-leaf kinds. The former are the earliest to mature, but are not to be compared for flavor and tenderness with the latter.

Seed of the early kinds, of which *White Plume* is an example, is sown in February in a greenhouse or hotbed. The young plants should be transplanted once or twice, either in shallow boxes filled with earth or in the open ground, before the plants are set out where they are to mature, in May or June. Celery naturally forms a long “tap root” with few fibers. The object of the successive transplantings is to check this “tap root”

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and promote the formation of a mass of fibrous feeding-roots. The plants are placed in single or double rows thirty inches or three feet apart, and from four to six inches apart in the rows. When they attain sufficient size they are blanched by placing boards, a foot wide and as long as can conveniently be handled, on either side of the row. Other methods of blanching are by slipping a drain-pipe over each plant or by wrapping around them a collar made of stout paper and tying it in place with twine.

Seed of late celery is sown about the same time as the early kinds, or a few weeks later, and the procedure is the same up until planting-time, which is early in July. Late celery is of stronger growth than the early varieties and needs more room for its development. The plants should be set in rows three and a half to four feet apart, and six inches apart in the rows. In some sections it is customary to dig a trench six inches or more deep and plant the celery in this. By this means watering is facilitated, and it is easier to blanch the celery later on. This method is not advisable when the good soil is shallow, as it results in the roots being placed in the infertile subsoil. Blanching of late celery is usually effected by mounding

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the stalks with earth dug from between the rows. Two persons can most advantageously perform this operation, one holding the stalks together so that the soil does not fall into the heart, the other mounding up the soil and patting it into position with the back of a spade.

It is not worth while to attempt to grow celery unless a rich, moist soil is available.

Good varieties of "self-blanching" celery are *White Plume* and *Golden Self-blanching*. Among the best of the "green-leaf" kinds are *Giant Pascal* and *Winter Queen*. The latter variety has a splendid flavor and keeps well into the winter.

CHARD.—One of the easiest to grow and most productive of the pot herbs is Swiss chard, "silver beet" or "leaf beet" as it is sometimes called. The seeds should be sown in rows about eighteen inches apart. When the plants are about four inches high they can be thinned so as to stand six inches apart and the thinnings used as "greens." Later on alternate plants should be taken out, so that finally each plant is a foot away from the next. After this stage is arrived at the chard should be picked by pulling off the outside leaves.

There are two varieties listed in the cata-

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logues. One, *Lucullus*, has crumpled leaves and very broad, thick, white midribs. This is the variety that should be grown when it is desired to cook and serve the midribs separately, after the fashion of asparagus.

Swiss chard is a form of beet which does not produce edible roots. Nitrate of soda, as recommended for kohlrabi, is an excellent fertilizer for this crop.

CORN, the most delectable of all vegetables, should receive the attention of all home gardeners who have sufficient room and a fairly rich soil. This is a vegetable the flavor of which rapidly deteriorates after the ears have been removed from the plant; therefore the store article can never be as good as the home-grown kind.

The hill and drill methods of planting each have their vehement advocates. Good crops can be obtained either way, but the drill method is probably best for the small garden. The seeds are planted in drills two inches deep, dropping two or three seeds at every foot. When they germinate, all but the strongest plant should be pulled up from each group. The rows can be two and a half feet apart for the small-growing kinds like *Golden Bantam*, and three feet for the larger varieties such as *Stowell's Evergreen*.

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When the hill system of cultivation is adopted, five or six seeds are planted in spaces two and a half or three feet apart each way. The young plants are thinned out to stand three or four to a hill.

Corn needs to be frequently hoed to get best results.

Several methods may be adopted in order to insure a succession of corn for the table. A quick-maturing variety may be planted at intervals of three weeks up to the middle of July, or, early, midseason, and late varieties may be planted at the same time in May or June.

The removal of the side shoots which appear in the axils of the leaves at the base of the plant should be attended to. This is known as "suckering." It causes the vigor of the plant to be concentrated in the production of ears instead of being frittered away on side shoots or "suckers" which will never amount to anything.

Corn should not be planted until the soil has warmed up and danger of frost is past. It is permissible, however, to take a chance with a few rows by sowing early, in the hope that they will come through all right—say about the end of April or beginning of May in those sections which possess a climate similar to that of New York.

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CUCUMBERS are a crop that requires a fair amount of room for proper development. They should be planted in hills five feet apart each way, with four or five plants in each hill; or in rows five feet apart, with the plants standing about one foot apart in the rows. The seeds should not be planted outdoors until all danger of frost is past. An early crop can be obtained by raising the plants in a greenhouse by sowing the seeds early in berry-boxes and transplanting outdoors when the weather is warm enough. It is a good plan, when planting outdoors, to sow the seeds rather thickly, about ten seeds to a hill, so as to get a good stand and lessen the risk of losing the plants by insect attacks.

The soil most suitable for cucumbers is a sandy loam that has been well enriched with decayed stable manure. They will succeed admirably on newly broken sod land.

The best cucumbers for outdoor planting are those belonging to the "white spine" type, of which *Davis Perfect* is a good example. For supplying small cucumbers for pickling, *Fordhook Pickling* is one of the best varieties to grow.

EGG-PLANT is a tropical plant which will not mature its fruits in the Northern states unless its season of growth is lengthened by

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starting the plants in a greenhouse or hotbed. It is very susceptible to cold and it is scarcely safe to set the young plants outdoors until June in the latitude of New York. Egg-plant requires a sunny position and a warm, light, fertile soil. It can be planted in rows two and a half to three feet apart, two feet being allowed between the plants in the rows. *Black Beauty* is a standard variety. *Early Long Purple* is a quick-maturing kind.

KALE.—The cultivation of kale is practically that of late cabbage. It is an extremely hardy vegetable and will stand a great deal of frost.

KOHLRABI is another member of the cabbage group. It is desirable to mature it quickly, as slow-grown plants are woody and inedible. This quick growth is effected by planting in rich soil and by giving top-dressings of nitrate of soda at the rate of one ounce to ten feet of row. The swollen stems should be eaten when they are about two inches in diameter. *Early Vienna*, either white or purple top, is a good variety. The seeds may be sown in the spring just as soon as the ground can be worked, in rows from fifteen to eighteen inches apart. When the young plants are large enough they are thinned to stand six inches apart in the

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rows; if so desired, the thinnings may be used as "greens."

LETTUCE, the most important salad crop, requires a rich, sandy soil. It is seldom that it will "head" properly in city back yards, because of unsuitable soil and other adverse conditions. Lettuce is a cool-weather crop, and during the hot days of summer the greatest difficulty is experienced in growing it. There are several different types. The loose-leaf kinds, those that do not form a head, are the easiest to grow. The other forms are the Romaine, or Cos, which makes a columnar head, and the ordinary kind, or cabbage lettuce.

The seeds should be planted shallowly in rows a foot or eighteen inches apart, and afterward the young plants must be thinned to stand ten or twelve inches apart in the row. A row twenty feet long is enough to plant at one sowing. Other plantings should be made at intervals of two or three weeks, so as to provide a succession. During hot weather the plants are benefited by being shaded with cheese-cloth screens. These can be conveniently made by tacking cheese-cloth on lath frames of suitable size, which should be supported on stakes driven into the ground.

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Quick growth is essential to obtain crisp, well-flavored lettuce. This can partially be brought about by the use of nitrate of soda, as recommended for kohlrabi. Avoid getting any of the nitrate on the leaves of the plants, as it will burn them.

Good varieties of lettuce are *May King* and *Hanson*, belonging to the cabbage-head type; *Grand Rapids*, a loose-leaf variety; and *Paris White Cos*.

In cities sparrows are frequently troublesome to growers of lettuce, as they are fond of picking off the leaves of the young plants. Protection is effected by stretching several strands of strong thread a few inches above the rows. The sparrows become very suspicious of an arrangement of this kind, and it is usually efficacious in keeping them away from the plants.

MUSKMELON.—The cultivation of this crop is very much like that of cucumber. Muskmelons are rather more susceptible to cold than the latter, and in consequence the soil and air must be warm before they are planted. The soil must be well drained or they will not succeed. When they have to be planted on land that is cold and poorly drained it is a good plan to plant them on ridges or mounds, about two feet across, raised six inches or so

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above the general level. This assists the soil in warming up and insures better drainage. A layer of decayed manure about three inches thick, buried in the hills where the plants are to grow, greatly helps this crop and others of a similar nature, such as cucumbers, squash, and pumpkin. Frequent cultivation of the surface soil is necessary to stimulate growth, keep down weeds, and conserve moisture, when the plants are young. Good varieties of muskmelon are *Emerald Gem*, a small or salmon-fleshed form, and *Rocky Ford* and *Hackensack*, which are of medium size with green flesh.

OKRA.—The cultivation of okra is very similar to that of corn, although otherwise they have nothing else in common. It succeeds best in a sandy, well-fertilized loam.

ONION.—There are two ways of producing a crop of onions—from “sets” and from seed. “Sets” are small onions produced by sowing seed very thickly in rather poor soil and allowing the plants to mature as they stand. This results in a crop of small bulbs which are stored over the winter and sold the following spring as onion “sets.” There are two methods of raising onions from seed. The plants may be obtained by sowing the seed in a greenhouse in February, trans-

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planting the seedlings to the open ground in April. The procedure most commonly followed, however, is to plant the seeds in rows a foot apart, in the position where they are to mature, as early as possible in the spring. When the young plants appear they are thinned to four inches apart. If the seedlings are left until they are the thickness of a lead-pencil they may be pulled and used as a salad in the form of bunch onions.

A crop can be produced earlier by the use of "sets." These are planted in furrows two inches deep, spacing them two inches apart. The soil is then drawn over them and firmed. After some growth has been made, alternate plants may be pulled out and used as salad, leaving the remainder to mature.

Thorough preparation of the soil is essential to achieve success in growing onions. It should be dug up as deeply as possible, thoroughly pulverized, and afterward compacted by rolling with a garden roller or by tramping. Onions succeed best on soil which is fairly retentive of moisture and rich in nitrogen. Top-dressings of hen or sheep manure, or of nitrate of soda, are beneficial to this crop. Remember what has been said previously with regard to taking care not to apply too much of any of these fertilizers.

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Weeding is a very important operation in connection with onion-growing, and some of it, when the weeds are close to or in the rows, has to be done by hand. If the weeds are allowed to obtain a headway the crop will suffer greatly in consequence.

In wet seasons, and when planted in rich, retentive soils, the bulbs sometimes fail to mature at the proper time. When they show signs of growing too late in the fall, it is customary to go over the plot and break over the tops. This can be done by dragging a board over the onion-bed, or, if the plot is a small one, it may be done by hand. This process arrests growth and causes the bulbs to mature so that they are suitable for winter storage. Immature bulbs will not keep properly.

Standard varieties of onion are *Yellow Danvers* and *Southport Globe*, which can be obtained in red, white, and yellow forms. *Prize-taker* is a very large, mild onion which succeeds best when started in a greenhouse.

PARSLEY succeeds best in a clay loam soil that has been well fertilized with stable manure. The seeds are slow to germinate and it is frequently four or five weeks before the young plants show themselves above the ground. Growth may be hastened by soak-

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ing the seeds in tepid water for twenty-four hours before sowing them. They should be planted in rows a foot apart and the young plants thinned to stand six inches apart. *Champion Moss Curled* is a good variety.

PARSNIP.—A long season is required for the development of large roots. The seeds should be sown in April in rows from fifteen to eighteen inches apart, afterward thinning the seedlings so that they stand six inches apart. The seeds are slow in germinating and it is a good plan to sow a few seeds of radish in the drill with them. The radishes germinate quickly and serve to break the surface crust and to mark the row so that cultivation may be performed close to the row without disturbing the parsnip seeds. The radishes are mature and can be pulled and used for the table by the time the parsnips have appeared above the ground.

A deep, loamy soil is most suited for the production of parsnips. In a shallow soil the roots are likely to be stunted and misshapen. The following method of producing extra-large and well-shaped roots is sometimes used by exhibitors of vegetables. Holes about two feet deep and three inches in diameter at the top are made in the ground with a crowbar at intervals of about nine inches.

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These holes are filled with sifted fertile earth, and three or four seeds planted in each. When the seedlings appear, all but the strongest are pulled out. This method is only to be recommended when it is desired to walk off with the prize for the best parsnips at the county fair or the town vegetable show. *Hollow Crown* is a good variety.

PEAS are essentially a cool-weather crop, and they especially resent hot, dry conditions at the root. For this reason the seeds should be planted just as soon as the ground is workable in the spring. The dwarf varieties can be planted in double rows about six inches apart, leaving a space of eighteen inches or two feet between each double row. The tall varieties, which need support of some kind, may be planted in the same way, but a space varying from three to five feet must be allowed between the rows, according to the height of the variety planted. The taller the variety, the greater is the necessity for ample space between the rows.

It is said to be possible to produce a crop of peas in the fall by sowing the seeds in August, but the writer has never seen much success attained with a crop at this season; at any rate, not in the vicinity of New York. For a late crop of peas it is advisable to dig a

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trench from six to eight inches deep and sow the seeds in this, covering them with two inches of soil, as usual. Water them thoroughly if the weather is dry. As the plants grow the earth should be gradually drawn into the trench until it is filled up to the surrounding level. This system is adopted so that the roots may be well down in the earth and thus protected from the hot rays of the sun. This is also a good method to adopt for late spring plantings of peas.

A fairly fertile, loamy soil, well drained, but of a retentive nature, is most suited to peas.

First of All, thirty inches high, is a good variety of the smooth-seeded type of pea. This type does not possess such a good flavor as the wrinkled-seeded kinds, but the seeds are not likely to rot if planted in cold, wet soil. *Nott's Excelsior* is an excellent dwarf variety of the wrinkled-seed type. Of the tall kinds, *Alderman*, five feet in height, *Gradus*, thirty inches, and *Champion of England*, five feet, are to be recommended.

PEPPERS require very much the same conditions as tomatoes and egg-plant, except that they may be planted somewhat closer together. The rows should be from eighteen inches to two feet apart, with the plants spaced from one to two feet apart in the rows. *Bull Nose*

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and *Chinese Giant* are good examples of the mild, sweet kinds, with *Golden Queen* to give color variation in the salad made from them. *Long Red Cayenne* and *Red Chili* should be chosen if the peppery varieties are desired.

POTATO.—The largest crops of potatoes are produced in cool, moist, climates such as are found in Great Britain, parts of Europe, and, in the United States, in Maine and Michigan.

The soils best suited for potatoes are fertile, rather sandy loams which should be fairly retentive of moisture. A soil of this nature which has been heavily fertilized with barn-yard manure the preceding year may be considered ideal for potato culture. The use of barn-yard manure, particularly if it is fresh, is inadvisable if the soil contains a good proportion of humus and is in good physical condition. It is claimed that the practice of using barn-yard manure the current season causes the crop to be more susceptible to attacks of potato scab. Many of the largest growers of potatoes refrain from fertilizing directly with barn-yard manure, but rely instead on the use of commercial fertilizers. These may be applied broadcast over the field in the spring, after the soil has been plowed, and harrowed in. If only a small quantity of fertilizer is available, it is prefera-

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ble to apply it by spreading it in the furrows, but thoroughly mixing it in the soil before the potatoes are planted. The fertilizer obtainable from most seedsmen under the name of "potato manure" can safely be used in the furrows at the rate of five pounds to a plot of four hundred square feet.

"Seed" potatoes should consist of medium-sized tubers, Northern grown, and free from disease. Although whole potatoes may be planted, the usual practice is to cut them into pieces, each piece containing two or three "eyes," or buds. When cutting the potatoes for sets make each piece as "chunky" as possible so that there is a good-sized piece of potato for the "eyes" to draw upon for their food supply until they have formed a root system of their own.

There are two methods of planting potatoes—in hills and in furrows or rows. In the hill system of planting, the plants are spaced from two to three feet apart either way, the distance being dependent on the vigor of the variety. When planted in furrows the rows are spaced from two to three feet apart and the sets placed from twelve to eighteen inches apart in the rows. The early varieties may be planted about four inches deep, and the late varieties about six inches.

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When the shoots appear above the ground the surface soil should be cultivated to conserve moisture and to keep down weeds. Later in the season when the tubers are being formed it is customary to hill them up with earth so as to cover the tubers and prevent "greening," and also to assist in keeping the roots cool.

The potato is particularly susceptible to environmental conditions. A variety that may be an excellent cropper in one section may be an utter failure in another. It is thus difficult to recommend any particular variety. The best plan for those who are to attempt the cultivation of potatoes is to make inquiry in the neighborhood with a view to finding the variety that is most successful in that locality.

The following are standard varieties that are widely grown: early varieties—*Irish Cobbler*, *Early Rose*, *Early Ohio*; main-crop varieties—*Carman No. 1*, *Green Mountain*, and *Rural New-Yorker*.

PUMPKINS will succeed under practically the same conditions as outlined for cucumber and melon. They are also subject to the same insect pests. This crop is frequently grown in the corn-patch, in hills about eight feet apart each way, planting five or six seeds to a hill.

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RADISHES are only palatable when they have been grown very quickly. If they are slow in coming to maturity the product is pithy and worthless.

A light, rich soil is most suited to the production of radishes. The seeds should be sown in rows nine inches or a foot apart and the seedlings thinned to about two inches. It does not pay to transplant radishes. Five or six feet of row is sufficient to plant at one time, securing a succession by planting other batches at intervals of about ten days. Radishes are usually not in great demand during the summer months, as the home grower has been surfeited by his spring crop. Those who are so fond of radishes that they want them throughout the whole season should plant *White Strasburg* or *Icicle* to mature during the hot weather, and *Cardinal Globe*, *Round Red Forcing*, or *French Breakfast* for an early crop.

Winter radishes, which form very large roots and may be stored by the same methods adopted for beets and carrots, are usually sown about the end of July or beginning of August. They need more space in which to mature—about eighteen inches between the rows and six inches in the rows.

RUTABAGA.—See TURNIP.

CULTURE OF VEGETABLES

SALSIFY or **VEGETABLE OYSTER** is a vegetable that is coming into more general use. Seeds are sown early in the spring on deeply broken ground in rows fifteen inches apart, and the plants thinned to three inches. The roots are dug in the fall and stored like beets, or they may be left in the ground and dug when required for use, if the weather permits.

SPINACH is a cool-weather crop that requires a light soil heavily manured with decayed stable manure for best results. The seeds should be planted in very early spring or in September, in rows fifteen inches apart, and the plants thinned to stand four inches apart. Nitrate of soda as recommended for kohlrabi is good for this crop.

SPINACH (NEW ZEALAND).—Although called spinach, this is an entirely different plant and belongs to another family. It luxuriates during hot weather and will supply the table plentifully with “greens” throughout the summer. Seeds should be planted during April or May in rows two feet apart, the plants later being thinned to one foot. When the plants attain a foot in height picking may begin, using the tender shoot-tips, or leaves, as required. The thinnings, of course, are also available for cooking.

SQUASH.—Cultivate the same as cucumber.

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The bush varieties should be planted four feet apart each way, and the vining kinds from six to eight feet.

There are several different types of squash. The summer kinds are represented by the *Pattypan* and *Crookneck* types, and the winter varieties by the *Hubbard*.

They are subject to much the same insect pests and diseases as the cucumber and muskmelon.

SWEET POTATOES are not very well adapted for Northern gardens, although they are grown to a considerable extent in parts of New Jersey.

They succeed best in a rich, sandy soil. The "sets" are usually planted on slightly raised, broad ridges about four feet apart. They are spaced from twelve to eighteen inches apart along the ridges.

The production of "sets" is usually effected by placing small potatoes in a hotbed and covering them with sand. This causes them to sprout, and when the shoots are six or eight inches in length they are pulled off with roots attached and planted as described.

Yellow Jersey is a good variety for Northern planting.

SWISS CHARD.—See under CHARD.

TOMATO.—This plant adapts itself to a

CULTURE OF VEGETABLES

great variety of soils, and will succeed almost anywhere if it receives warmth and sunshine.

It is seldom worth while for any one without greenhouse facilities, unless he wishes to have the experience, to raise tomatoes from seed. Young plants can be obtained at a low cost at planting-time from seedsmen who have every convenience for raising them cheaply.

The distance apart between the plants when they are set out in the garden depends on the method of training adopted. The truck farmers and market gardeners seldom go to the trouble of staking their plants. They are simply set out in the field three or four feet apart each way and allowed to grow naturally. This results in the spoiling of some of the fruit through coming in contact with the soil.

The home gardener can usually afford the time and trouble required to stake his tomatoes, and receives his reward in the shape of more fruit of better quality.

One method of training is to set out the plants a foot apart in rows three feet apart. If this scheme is adopted each plant must be supplied with a stout stake to which it is tied, and the plant must be restricted to a single stem. This last is effected by pinching out the side shoots with thumb and finger as

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soon as they are formed. Avoid taking off the flowering shoots or you will have no fruit.

Another method is to set the plants three feet by two feet, and support them as described in Chapter X. In this case it is advisable to prune out the thin, spindly shoots which frequently congregate in the centers of the plants. This causes the vigor of the plant to be concentrated in the strong, fruiting shoots, admits light and air, resulting in better ripened tomatoes.

They can also be trained on the south side of the house, supporting them with tape or cloth passed around the shoots and fastened to the wall with tacks.

Favorite tomatoes are *Chalk's Early Jewel* for an early crop, *Stone* and *Ponderosa* for main crop. In small gardens *Dwarf Stone* can be used to advantage.

TURNIP is a hardy crop well suited for early-spring or late-fall cultivation. For the early crop such varieties as *Snowball* or *Early White Milan* should be planted. The seed may be sown as soon as the ground is prepared in the spring, in rows a foot apart. When they are large enough the young plants must be thinned out to stand about four inches apart.

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Yellow Globe, *Golden Ball*, or the white strap-leaf kinds may be sown for fall use. They are cultivated in the same way as the preceding except that the seeds are sown in July or August.

Rutabaga turnips grow much larger than the preceding, require more room, and a longer period for development. They can be sown in May or June in rows two feet apart, and the young plants thinned out to stand about ten inches apart in the rows. Treated in this way, they will form large roots suitable for winter storage.

Turnips succeed best in a loamy soil in which there has been incorporated a liberal supply of well-decayed stable manure.

WATERMELON.—These plants succeed under much the same conditions, and need the same treatment as muskmelon. They are rampant growers and the hills should be spaced about eight feet apart each way. They are, therefore, not adapted for cultivation in very small gardens.

The striped cucumber-beetle is also partial to watermelon.

For planting in Northern gardens, quick-maturing varieties such as *Cole's Early* and *Fordhook* should be planted.

XIV

HARVESTING AND STORING

THE flavor and tenderness of many vegetables depend in a large measure on their being harvested at the proper time. The picking of string-beans should be early, constant, and methodical, partly because old beans are stringy and unpalatable and partly because, if picking is neglected and the plants allowed to form seed, production ceases. Peas should always be picked just as soon as the pods are well filled, before the seeds commence to harden. Their flavor deteriorates if they are picked more than an hour or two before they are needed for the table. The same remarks apply to sweet corn. There is an old saying that "the pot should be boiling before the ears are picked from the plant."

Great care should be taken in harvesting beets. If the roots are bruised or broken, or if the leaves are cut off too close to the root,

HARVESTING AND STORING

the color of the beets, one of their greatest attractions, will be lost in cooking. The crispness of salad plants—celery, lettuce, radish, and onion—is enhanced if they are gathered early in the morning and stood in water in a shady, cool place until they are required for use. Such crops as Brussels sprouts, kale, celery, and parsnips are considered to be improved in flavor after they have been slightly frozen. The fruits of tomato, watermelon, and muskmelon should be allowed to ripen on the plants. Muskmelons are ripe when the fruit parts readily from the stem on being lifted in the hand.

Proper harvesting is a prime necessity if vegetables are to be successfully stored for winter use. Bruised, broken or diseased vegetables should always be rejected, as decay is almost certain to take place when they are stored, and this is likely to spread to the sound vegetables.

A cellar with an earthen floor, well ventilated and frost-proof, in which a temperature of from 40° to 45° Fahr. can be maintained, forms a splendid storage-place for potatoes, the majority of the root crops, and some of the leaf vegetables. If there is a furnace in the cellar which raises the temperature too much, the coolness required may be obtained

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by partitioning off part of the cellar, preferably in a corner containing a window, so that ventilation may be secured.

Quite a number of vegetables can be successfully stored in the open by burying them in pits or trenches and covering with straw, salt hay, and earth. Some of the disadvantages of this method are the inaccessibility of the vegetables when the weather is severe, and the difficulty of looking them over occasionally so that diseased and decayed specimens may be removed. When storing vegetables in this way it is important that the whole of the covering should not be put on at one time, as this endangers the whole pile of vegetables through the possibility of heating.

Root, Tuber, and Bulb Crops

ARTICHOKE (JERUSALEM).—The tubers of this plant are unaffected by frost and may be allowed to remain in the ground all winter. In those sections where the frost penetrates the ground deeply a supply sufficient for use during the winter should be dug in the fall and stored in sand in a cool cellar.

PARSNIP, HORSERADISH, and SALSIFY may be treated in the same way as the preceding.

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BEETS should be carefully dug up after the first frost and handled gently to avoid breaking or bruising them. Cut off the leaves about an inch above the roots and pack them with moist sand or earth in boxes in a cool cellar. Covering the roots in this way maintains their freshness and prevents shriveling.

CARROTS.—In the fall large numbers of fibrous roots are produced on the sides of the large tap-root. These roots spoil the symmetry of the carrots and impair their flavor. The crop should therefore be harvested before these fibrous roots form. Observation of the roots is the only way of determining the proper time to dig them up. In other respects they are stored the same as beets.

POTATOES for winter use should be dug on a dry day as soon as possible after the tops have died down. Leave them lying on the surface of the ground for a few hours, so that they may dry properly. (It is inadvisable to allow them to be exposed to the light for too long a period, as it will cause the tubers to become green and unfit for use.) They can then be gathered up and placed in boxes or barrels in a cool, frost-proof cellar, but not exposed to the light. All diseased or injured tubers should be laid aside for immediate use, provided they are not too far gone, in

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which case they may be boiled and fed to pigs or chickens, or destroyed by burning, so as to avoid the possibility of spreading disease.

Potatoes may also be stored outdoors in sections where the winters are not too severe. A high-lying sandy piece of ground should be chosen on which to make the "pit." Dig out the soil for a depth of about six inches and line the excavation with three inches of straw. Place the potatoes in a pile on this and cover with a similar thickness of straw or hay. Place over this a layer of earth three inches thick to prevent the straw from blowing away. Gradually increase the covering as the weather becomes more severe, until a thickness of a foot or eighteen inches is reached. A layer of manure over this is advisable in very cold climates. If the pile is a large one it is important that ventilation should be provided for. This may be accomplished by sticking a stovepipe into the center of the pile and allowing the top to project above the covering of earth, or by allowing a tuft of the straw that forms the first covering to extend in the same manner. This vent-hole must be covered with a board, a piece of oilcloth, or something similar to prevent rain from entering.

HARVESTING AND STORING

Other vegetables that may be stored in this way are *beets, carrots, turnips, salsify, and parsnips*.

RUTABAGAS and TURNIPS require to be dug up before severe frost. They can be stored the same way as potatoes.

SWEET POTATOES are very difficult to store over the winter. The loss through decay in storage is enormous every year, even though proper facilities are obtainable. They need a warm, dry room and a constant temperature. The less they are handled after being stored the better. The best advice for those who have raised a crop of this vegetable is to avoid loss by eating them as quickly as possible.

ONIONS should be properly "cured" before they are stored. This is accomplished by harvesting them during dry, settled weather, and allowing them to lie in windrows two or three days before bringing them indoors. They should then be placed in a cool, airy room in slatted crates, so that air has free access to them. If wet weather is prevalent at harvesting-time they may be "cured" by placing them in a single layer under cover until they are thoroughly dry. The dead leaves and loose scales should be pulled off before storing them.

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Leaf Crops

CABBAGES can be stored by digging them up with some soil attached to the roots, and packing them close together on the floor of a cool cellar. Treated in this way, they are a rather "smelly" vegetable, and, unless the cellar is tightly shut off from the rest of the house, likely to cause some unpleasantness. They can be stored outside in the way recommended for potatoes by placing them head downward in a trench or pit.

CAULIFLOWER.—It is possible to preserve cauliflower, for a short time only, by digging them with roots attached and suspending them head downward in a cool, moist cellar.

CELERY can be dug in the fall and packed closely in boxes in an upright position in a cool cellar. The more roots and soil adhering to the plants the better the chance of success. When the soil dries out it must be watered, but be very careful not to get any water on the leaves or leaf-stalks. Another way of caring for celery is to dig a trench deep enough to accommodate the plants when they are placed upright. Pack them as tightly as possible in this and cover with boards to keep out rain. In severe weather it will be neces-

HARVESTING AND STORING

sary to put on an additional covering of straw and earth.

PARSLEY.—In sections where the winter is not too severe parsley may be kept green through the greater part of the winter by covering the patch with a bottomless box, with a pane of glass for covering the top. The box should be banked with manure or leaves, and the glass covered with straw in very cold weather. Parsley can also be dug up, placed in plant-pots, making the soil firm about the roots, and kept in a cool, sunny room.

Seed or Fruit Crops

BEANS.—Dry shell beans should be allowed to stay on the plants until the pods dry up and become yellow. They may then be gathered, and shelled when convenient. If they are infested with weevils they should be dry baked in a temperature of about 145° Fahr. Care must be taken not to allow the temperature to rise above this figure, or the beans will be roasted and spoiled. Fumigating with carbon disulphide is also an efficacious expedient, but somewhat dangerous because of the explosive properties of the fumigant.

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PUMPKIN and WINTER SQUASH can be stored in a warm, dry room. It is advisable to turn over the fruits selected for storing two weeks or so before they are harvested, so that the side that has been lying on the ground may have its rind hardened by exposure to sun and air.

Although concerned primarily with "war gardens," the methods advocated can be used by all vegetable-growers who practise intensive cultivation. The fundamental principles of soil management also apply equally to flower-gardens.

The writer has found in his experience that good crops can be raised, on what would be usually considered poor soil, by men and women who know little of horticultural practices. Larger crops could have been produced had they known more of the art of growing vegetables. It is to help such people that this book has been written, from information gained during twenty years of professional experience.

It is the earnest hope of the author that the crops raised by "war gardeners" will be of such a size as to cause this last chapter to be the one that is most consulted.

APPENDIX

Table I

Approximate quantities of vegetables obtainable from a row fifty feet long. This table is based on actual yields obtained from a plot of moderate fertility by using standard varieties of vegetables.

Beets.....	40 bunches (5 in a bunch)
Bush beans (pods)	27 quarts
Cabbage.....	25 heads
Carrots.....	45 pounds
Cauliflower.....	25 heads
Corn.....	100 ears
Egg-plant.....	100 fruits
Lettuce.....	50 heads
Onions.....	20 pounds
Parsnips.....	40 pounds
Peas (pods).....	20 quarts
Potatoes.....	5 pecks
Tomatoes.....	240 pounds

Table II

Approximate number of days from seed-sowing to first picking of crops. Variation

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is caused by temperature and character of variety—early, midseason, or late.

Beans (bush).....	45 to	65 days
“ (pole).....	60 “	80 “
Beets.....	60 “	80 “
Cabbage (early).....	95 “	120 “
“ (late).....	100 “	130 “
Carrots.....	75 “	110 “
Cauliflower.....	100 “	130 “
Celery.....	125 “	150 “
¹ Chard.....	60 “	80 “
Corn (sweet).....	60 “	100 “
¹ Cucumber.....	60 “	80 “
¹ Egg-plant.....	125 “	160 “
Kale.....	100 “	120 “
Kohlrabi.....	60 “	80 “
Lettuce.....	65 “	100 “
¹ Muskmelon.....	115 “	140 “
¹ Okra.....	90 “	100 “
¹ Onion (seed).....	130 “	150 “
¹ “ (sets).....	90 “	120 “

If “sets” are planted for use as bunch onions they are ready in about 40 days.

¹ Parsley.....	90 to	100 days
Parsnips.....	125 “	150 “
Peas.....	45 “	80 “
¹ Peppers.....	120 “	150 “
Potato (Irish).....	80 “	140 “
“ (sweet).....	100 “	130 “
Pumpkin.....	100 “	130 “
Radish.....	25 “	50 “
Salsify.....	125 “	150 “

¹ Continue to bear until frost.

APPENDIX

Spinach.....	30 to	60 days
¹ " New Zealand.....	60 "	70 "
¹ Squash (summer).....	60 "	80 "
Squash (winter).....	125 "	130 "
¹ Tomato.....	100 "	125 "
Turnip.....	60 "	80 "

Table III

Showing the correct depth to plant seeds and the amount of space required by the plants in and between rows.

	Depth to plant	Distance between rows	Distance be- tween plants in the rows
Bean (pole).....	2 in.	3-4 ft.	3-4 ft. if in hills, 9 ins. if in rows.
Bean (dwarf)....	2 in.	15-18 in.	3-6 in.
Bean (dwarf Lima).....	2 in.	2-2½ ft.	6-10 in.
Beet.....	1 in.	15-18 in.	4 in.
Cabbage (early) .¼ in.	¼ in.	2-3 ft.	1½-2 ft.
" (late) .¼ in.	¼ in.	3 ft.	2 ft.
Carrot.....	½ in.	15-18 in.	4 in.
Celery.....	⅛ in.	2½-5 ft.	4-6 in.
Chard.....	1 in.	15-18 in.	6-12 in.
Corn.....	2 in.	2½-3 ft.	2½-3 ft. if in hills, 1 ft. if in rows.
Cucumber.....	1 in.	4-5 ft.	15 in.
Egg-plant.....	¼ in.	2½-3 ft.	2 ft.
Kale.....	¼ in.	18-24 in.	8-10 in.

¹ Continue to bear until frost.

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	Depth to plant	Distance between rows	Distance be- tween plants in the rows
Kohlrabi.....	$\frac{1}{4}$ in.	15-18 in.	6 in.
Lettuce.....	$\frac{1}{4}$ in.	1 ft.	9-12 in.
Muskmelon.....	1 in.	-6 ft.	18 in.
Okra.....	1 in.	3 ft.	2 ft.
Onion (seed)....	1 in.	1 ft.	4 in.
" (sets)....	2 in.	1 ft.	2 in.
Parsley.....	$\frac{1}{2}$ in.	1 ft.	6-9 in.
Parsnip.....	1 in.	15-18 in.	6 in.
Peas (dwarf)....	2 in.	18-24 in.	2 in.
" (tall)....	2 in.	4- 6 ft.	3 in.
Peppers.....	$\frac{1}{4}$ in.	2 ft.	12-18 in.
Potato.....	4-6 in.	$2\frac{1}{2}$ -3 ft.	12-18 in.
Radish.....	$\frac{1}{2}$ in.	9-12 in.	2 in.
Salsify.....	1 in.	15-18 in.	2 in.
Spinach.....	1 in.	12-15 in.	4 in.
" New Zea- land... 1 in.		2 ft.	1 ft.
Squash bush)... 1 in.		3-4 ft.	3-4 ft.
" (vine)... 1 in.		7-10 ft.	7-10 ft.
Swiss Chard, <i>see</i> Chard.			
Tomato.....	$\frac{1}{2}$ in.	3 ft.	1 ft. if trained to singlestem, 2-3 feet if al- lowed to grow naturally.
Turnip.....	$\frac{1}{2}$ in.	15-18 in.	6 in.

Table IV

Quantity of seeds required to plant a row
one hundred feet long, and time of planting.

APPENDIX

	Time to plant	Quantity required
Bean (pole)	Late May or early June	$\frac{1}{2}$ pint
“ (dwarf)	May 10 to August	1 “
¹ Beet	April to August	2 oz.
¹ Cabbage (early)	Feb. indoors; plants set out in March or April	1 pkt.
“ (late)	May; plants set out in June or July	1 pkt.
¹ Carrot	April to July	1 oz.
Cauliflower (early)	Treat like Cabbage	1 pkt.
“ (late)	“ “ “	“
Celery	March indoors; plants set out in June or July	“
¹ Chard	April	1 oz.
Corn	May 10 to July 10	$\frac{1}{2}$ pint
¹ Cucumber	Late May or early June	$\frac{1}{2}$ oz.
Egg-plant	March indoors; plants set out early in June	1 pkt.
Kale, <i>see</i> Cabbage (late)		
Kohlrabi	April to August	$\frac{1}{4}$ oz.
¹ Lettuce	April to August	$\frac{1}{2}$ oz.
¹ Muskmelon	Early June	$\frac{1}{2}$ oz.
¹ Okra	May or June	2 oz.
Onion (seed)	April and May	1 oz.
“ (sets)	March 15 to May 15	1 quart
¹ Parsley	April	$\frac{1}{4}$ oz.
¹ Parsnip	“	$\frac{1}{2}$ oz.
¹ Peas	March 15 to May and August 1 to 20	1 quart

¹Are hardy vegetables, and will stand slight frost. Should be planted as soon as the ground can be worked. Dates given are approximate and apply in the vicinity of New York. Other localities should take into consideration the effects of elevation and latitude.

WAR GARDENS

	Time to plant	Quantity required
Peppers.....	March indoors; plants set out in late May or early June	1 pkt.
¹ Potato.....	April to June	1 peck
¹ Radish.....	March to September	1 oz.
¹ Salsify.....	April	1 oz.
¹ Spinach.....	March and September	1 oz.
Squash.....	Late May or early June	½ oz.
¹ Swiss Chard, <i>see</i> Chard.		
Tomato.....	March indoors; plants set out in late May or early June	1 pkt.
Turnip.....	April, July and August	½ oz.

¹Are hardy vegetables, and will stand slight frost. Should be planted as soon as the ground can be worked. Dates given are approximate and apply in the vicinity of New York. Other localities should take into consideration the effects of elevation and latitude.

THE END

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