Starting Vegetable Plants Under Glass

F. F. Rockwell, 1911

Selected pages from Home Vegetable Gardening.

Raise seedlings in flats, hotbeds and cold frames, then harden them off for outdoor planting.

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Part Two—Vegetables

Chapter VIII.

STARTING THE PLANTS

THIS beautifully prepared garden spot—or rather the plant food in it—is to be transformed into good things for your table, through the ever wonderful agency of plant growth. The thread of life inhering in the tiniest seed, in the smallest plant, is the magic wand that may transmute the soil's dull metal into the gold of flower and fruit.

All the thought, care and expense described in the preceding chapters are but to get ready for the two things from which your garden is to spring, in ways so deeply hidden that centuries of the closest observation have failed to reveal their inner workings. Those two are seeds and plants. (The sticklers for technical exactness will here take exception, calling our attention to tubers, bulbs, corms and numerous other taverns where plant life puts up over night, between growth and growth, but for our present purpose we need not mind them.)

The plants which you put out in your garden will have been started under glass from seed, so that, in-

directly, everything depends on the seed. Good seeds, and true, you must have if your garden is to attain that highest success which should be our aim. Seeds vary greatly—very much more so than the beginner has any conception of. There are three essentials; if seeds fail in any one of them, they will be rendered next to useless. First, they must be true; selected from good types of stock and true to name; then they must have been good, strong, plump seeds, full of life and gathered from healthy plants; and finally, they must be fresh.* It is therefore of vital importance that you procure the best seeds that can be had, regardless of cost. Poor seeds are dear at any price; you cannot afford to accept them as a gift. It is, of course, impossible to give a rule by which to buy good seed, but the following suggestions will put you on the safe track. First, purchase only of some reliable mail-order house; do not be tempted, either by convenience or cheapness, to buy the gaily lithographed packets displayed in grocery and hardware stores at planting time—as a rule they are not reliable; and what you want for your good money is good seed, not cheap ink. Second, buy of seedsmen who make a point of growing and testing their own seed. Third, to begin with, buy from several houses and weed out to the one which proves, by actual results, to be the most reliable. Another

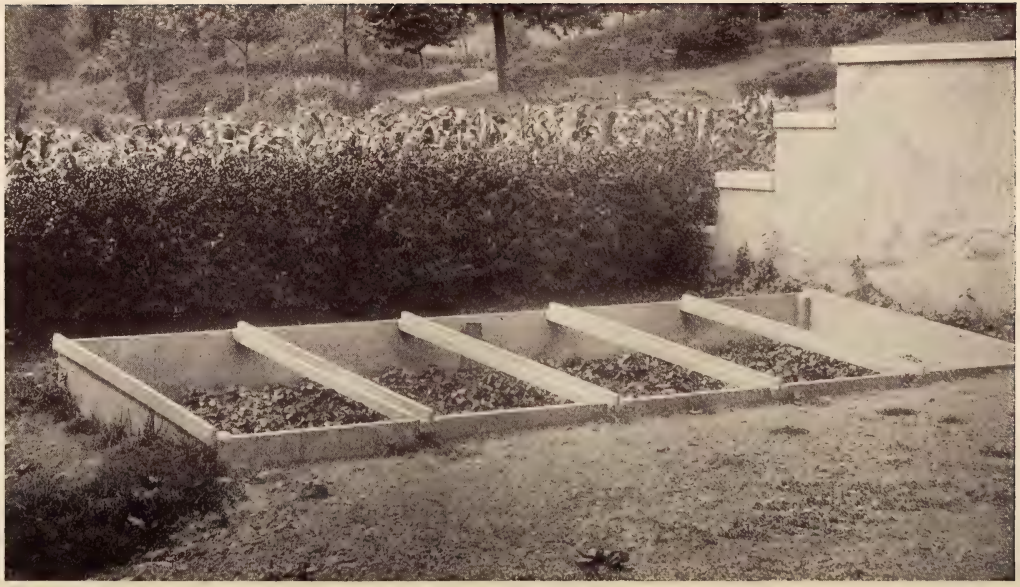
*See table, page 85.

good plan is to purchase seed of any particular variety from the firm that makes a leading specialty of it; in many cases these specialties have been introduced by these firms and they grow their own supplies of these seeds; they will also be surer of being true to name and type.

Good plants are, in proportion to the amounts used, just as important as good seed—and of course you cannot afford losing weeks of garden usefulness by growing entirely from seed sown out-doors. Beets, cabbage, cauliflower, lettuce, tomatoes, peppers, egg-plant, and for really efficient gardening, also onions, corn, melons, celery, lima beans, cucumbers, and squash, will all begin their joyous journey toward the gardener's table several weeks before they get into the garden at all. They will all be started under glass and have attained a good, thrifty, growing size before they are placed in the soil we have been so carefully preparing for them. It is next to impossible to describe a "good" vegetable plant, but he who gardens will come soon to distinguish between the healthy, short-jointed, deep-colored plant which is ready to take hold and grow, and the soft, flabby (or too succulent) drawn-up growth of plants which have been too much pampered, or dwarfed, weazened specimens which have been abused and starved; he will learn that a dozen of the former will yield more than fifty of the latter.



How one home-owner solved the problem of securing an effective and unobtrusive place for raising seedlings in the early spring. Unfortunately, not many houses have a roof of this form, but perhaps there is some other place about your own home in which you can build a garden under glass



Whether your place is one of several acres, or merely a plot 50x150 feet, you should have a hotbed or a coldframe to gain a month on summer every year and to carry over through the winter tender plants that cannot survive exposure

Plants may be bought of the florist or market gardener. If so, they should be personally selected, some time ahead, and gotten some few days before needed for setting out, so that you may be sure to have them properly "hardened off," and in the right degree of moisture, for transplanting, as will be described later.

By far the more satisfactory way, however, is to grow them yourself. You can then be sure of having the best of plants in exactly the quantities and varieties you want. They will also be on hand when conditions are just right for setting them out.

For the ordinary garden, all the plants needed may be started successfully in hotbeds and coldframes. The person who has had no experience with these has usually an exaggerated idea of their cost and of the skill required to manage them. The skill is not as much a matter of expert knowledge as of careful regular care, daily. Only a few minutes a day, for a few sash, but every day. The cost need be but little, especially if one is a bit handy with tools. The sash which serves for the cover, and is removable, is the important part of the structure. Sash may be had, ready glazed and painted, at from $2.50 to $3.50 each, and with care they will last ten or even twenty years, so you can see at once that not a very big increase in the yield of your garden will be required to pay interest on the investment.

Or you can buy the sash unglazed, at a proportionately lower price, and put the glass in yourself, if you prefer to spend a little more time and less money. However, if you are not familiar with the work, and want only a few sash, I would advise purchasing the finished article. In size they are three feet by six.

Frames upon which to put the sash covering may also be bought complete, but here there is a chance to save money by constructing your own frames—the materials required being 2 x 4 in. lumber for posts, and inch-boards; or better, if you can easily procure them, plank 2 x 12 in.

So far as these materials go the hotbed and coldframe are alike. The difference is that while the coldframe depends for its warmth upon catching and holding the heat of the sun's rays, the hotbed is artificially heated by fermenting manure, or in rare instances, by hot water or steam pipes.

In constructing the hotbed there are two methods used; either by placing the frames on top of the manure heap or by putting the manure within the frames. The first method has the advantage of permitting the hotbed to be made upon frozen ground, when required in the spring. The latter, which is the better, must be built before the ground freezes, but is more economical of manure. The manure in either case should be that of grain-fed horses, and if a small amount of straw bedding, or leaves—not

more, however, than one-third of the latter—be mixed among it, so much the better. Get this manure several days ahead of the time wanted for use and prepare by stacking in a compact, tramped-down heap. Turn it over after three or four days, and re-stack, being careful to put the former top and sides of the pile now on the inside.

Having now ready the heating apparatus and the superstructure of our miniature greenhouse, the building of it is a very simple matter. If the ground is frozen, spread the manure in a low, flat heap—nine or ten feet side, a foot and a half deep, and as long as the number of sash to be used demands—a cord of manure thus furnishing a bed for about three sash, not counting for the ends of the string or row. This heap should be well trodden down and upon it should be placed or built the box or frame upon which the sash are to rest. In using this method it will be more convenient to have the frame made up beforehand and ready to place upon the manure, as shown in one of the illustrations. This should be at least twelve inches high at the front and some half a foot higher at the back. Fill in with at least four inches—better six—of good garden soil containing plenty of humus, that it may allow water to soak through readily.

The other method is to construct the frames on the ground before severe freezing, and in this case

the front should be at least twenty-four inches high, part of which—not more than half—may be below the ground level. The 2 x 12 in. planks, when used, are handled as follows: stakes are driven in to support the back plank some two or three inches above the ground,—which should, of course, be level. The front plank is sunk two or three inches into the ground and held upright by stakes on the outside, nailed on. Remove enough dirt from inside the frame to bank up the planks about halfway on the outside. When this banking has frozen to a depth of two or three inches, cover with rough manure or litter to keep frost from striking through. The manure for heating should be prepared as above and put in to the depth of a foot, trodden down, first removing four to six inches of soil to be put back on top of the manure,—a cord of the latter, in this case, serving seven sashes. The vegetable to be grown, and the season and climate, will determine the depth of manure required—it will be from one to two feet,—the latter depth seldom being necessary.

It must not be overlooked that this manure, when spent for heating purposes, is still as good as ever to enrich the garden, so that the expense of putting it in and removing it from the frames is all that you can fairly charge up against your experiment with hotbeds, if you are interested to know whether they really pay.

The exposure for the hotbeds should be where the sun will strike most directly and where they will be sheltered from the north. Put up a fence of rough boards, five or six feet high, or place the frames south of some building.

The coldframe is constructed practically as in the hotbed, except that if manure is used at all it is for the purpose of enriching the soil where lettuce, radishes, cucumbers or other crops are to be grown to maturity in it.

If one can put up even a very small frame greenhouse, such as illustrated facing page 3, it will be a splendid investment both for profit and for pleasure. The cost is lower than is generally imagined, where one is content with a home-made structure. Look into it.

PREPARING THE SOIL

All this may seem like a lot of trouble to go to for such a small thing as a packet of seed. In reality it is not nearly so much trouble as it sounds, and then, too, this is for the first season only, a well built frame lasting for years—forever, if you want to take a little more time and make it of concrete instead of boards.

But now that the frame is made, how to use it is the next question.

The first consideration must be the soil. It should be rich, light, friable. There are some garden loams

that will do well just as taken up, but as a rule better results will be obtained where the soil is made up specially as follows: rotted sods two parts, old rotted manure one part, and enough coarse sand added to make the mixture fine and crumbly, so that, even when moist, it will fall apart when pressed into a ball in the hand. Such soil is best prepared by cutting out sod, in the summer, where the grass is green and thick, indicating a rich soil. Along old fences or the roadside where the wash has settled will be good places to get limited quantities. Those should be cut with considerable soil and stacked, grassy sides together, in layers in a compost pile. If the season proves very dry, occasionally soak the heap through. In late fall put in the cellar, or wherever solid freezing will not take place, enough to serve for spring work under glass. The amount can readily be calculated; soil for three sash, four inches deep, for instance, would take eighteen feet or a pile three feet square and two feet high. The fine manure (and sand, if necessary) may be added in the fall or when using in the spring. Here again it may seem to the amateur that unnecessary pains are being taken. I can but repeat what has been suggested all through these pages, that it will require but little more work to do the thing the best way as long as one is doing it at all, and the results will be not only better, but practically certain—and that

is a tremendously important point about all gardening operations.

SOWING THE SEED

Having now our frames provided and our soil composed properly and good strong tested seed on hand, we are prepared to go about the business of growing our plants with a practical certainty of success—a much more comfortable feeling than if, because something or other had been but half done, we must anxiously await results and the chances of having the work we had put into the thing go, after all, for nothing.

The seed may be sown either directly in the soil or in "flats." Flats are made as follows: Get from your grocer a number of cracker boxes, with the tops. Saw the boxes lengthwise into sections, a few two inches deep and the rest three. One box will make four or five such sections, for two of which bottoms will be furnished by the bottom and top of the original box. Another box of the same size, knocked apart, will furnish six bottoms more to use for the sections cut from the middle of the box. The bottoms of all, if tight, should have, say, five three-quarter-inch holes bored in them to allow any surplus water to drain off from the soil. The shallow flats may be used for starting the seed and the three-inch ones for transplanting. Where sowing but a

small quantity of each variety of seed, the flats will be found much more convenient than sowing directly in the soil—and in the case of their use, of course, the soil on top of the manure need be but two or three inches deep and not especially prepared.

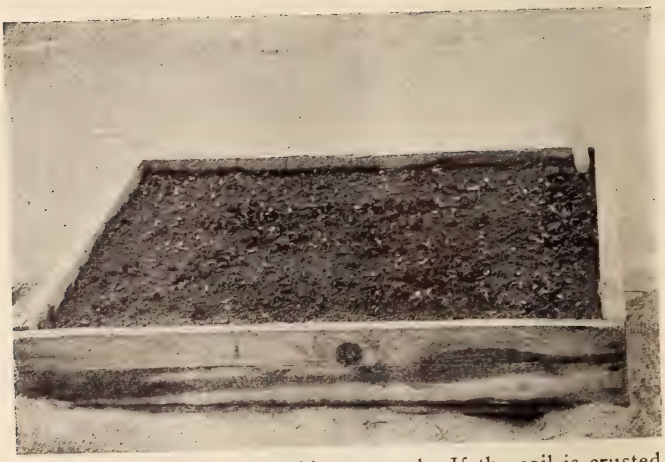
Where the seed is to go directly into the frames, the soil described above is, of course, used. But when in flats, to be again transplanted, the soil for the first sowing will be better for having no manure in it, the idea being to get the hardest, stockiest growth possible. Soil for the flats in which the seeds are to be planted should be, if possible, one part sod, one part chip dirt or leaf mould, and one part sand.

The usual way of handling the seed flats is to fill each about one-third full of rough material—screenings, small cinders or something similar—and then fill the box with the prepared earth, which should first be finely sifted. This, after the seeds are sown, should be copiously watered—with a fine rose spray, or if one has not such, through a folded bag, as illustrated facing page 55, to prevent the washing of the soil.

Here is another way which I have used recently and, so far, with one hundred per cent. certainty of results. Last fall, when every bit of soil about my place was ash dry, and I had occasion to start immediately some seeds that were late in reaching me,



A coldframe need by no means be an unsightly garden accessory. This frame is tucked away in a southeastern angle of the house



A flat of cabbage just breaking ground. If the soil is crusted and makes "tents," break it through by watering



Cabbage almost ready for transplanting. The first leaves are just showing

my necessity mothered the following invention, an adaptation of the principle of sub-irrigation. To have filled the flats in the ordinary way would not have done, as it would have been impossible ever to wet the soil through without making a solid mud cake of it, in which seeds would have stood about as good a chance of doing anything as though not watered at all. I filled the flats one-third full of sphagnum moss, which was soaked, then to within half an inch of the top with soil, which was likewise soaked, and did not look particularly inviting. The flats were then filled level-full of the dust-dry soil, planted, and put in partial shade. Within half a day the surface soil had come to just the right degree of moisture, soaked up from below, and there was in a few days more a perfect stand of seedlings. I have used this method in starting all my seedlings this spring—some forty thousand, so far—only using soil screenings, mostly small pieces of decayed sod, in place of the moss and giving a very light watering in the surface to make it compact and to swell the seed at once. Two such flats are shown facing p. 86, just ready to transplant. The seedlings illustrated in the upper flat had received just two waterings since being planted.

Where several hundred or more plants of each variety are wanted, sow the seed broadcast as evenly as possible and fairly thick—one ounce of cabbage,

for instance, to three to five 13 x 19 inch flats. If but a few dozen, or a hundred, are wanted, sow in rows two or three inches apart, being careful to label each correctly. Before sowing, the soil should be pressed firmly into the corners of the flats and leveled off perfectly smooth with a piece of board or shingle. Press the seed evenly into the soil with a flat piece of board, cover it lightly, one-eighth to one-quarter inch, with sifted soil, press down barely enough to make smooth, and water with a very fine spray, or through burlap.

For the next two days the flats can go on a pretty hot surface, if one is available, such as hot water or steam pipes, or top of a boiler, but if these are not convenient, directly into the frame, where the temperature should be kept as near as possible to that indicated in the table on the next page.

In from two to twelve days, according to temperature and variety, the little seedlings will begin to appear. In case the soil has not been made quite friable enough, they will sometimes "raise the roof" instead of breaking through. If so, see that the surface is broken up at once, with the fingers and a careful watering, as otherwise many of the little plants may become bent and lanky in a very short time.

From now on until they are ready to transplant, a period of some three or four weeks, is the time when

they will most readily be injured by neglect. There are things you will have to look out for, and your

VEGETABLE	DATE TO SOW	SEED WILL KEEP (ABOUT)	BEST TEMPERATURE TO GERMINATE (ABOUT)
Beets	Feb. 15–Apr. 1	5 years	55 degrees
Broccali	Feb. 15–Apr. 1	5 "	
Brussels Sprouts	Feb. 15–Apr. 1	7 "	
Cabbage	Feb. 1–Apr. 1	7 "	
Cauliflower	Feb. 1–Apr. 1	7 "	
Celery	Feb. 15–Apr. 1	8 "	50 "
Corn	Apr. 1–May 1	2 "	65 "
Cucumber	Mar. 15–May 1	10 "	75 "
Egg-plant	Mar. 1–Apr. 15	7 "	75 "
Kohlrabi	Mar. 1–Apr. 1	7 "	55 "
Lettuce	Feb. 15–Apr. 1	5 "	55 "
Melon, musk.	Apr. 1–May 1	7 "	75 "
Melon, water	Apr. 1–May 1	7 "	75 "
Okra	Mar. 15–Apr. 15	3 "	65 "
Onion	Jan. 15–Mar. 15	2 "	50 "
Pepper	Mar. 1–Apr. 15	5 "	75 "
Squash	Mar. 15–Apr. 15	7 "	75 "
Tomato	Mar. 1–Apr. 15.	5 "	75 "

attention must be regular to the matters of temperature, ventilation and moisture.

The temperatures required by the different varieties will be indicated by the table above. It should be kept as nearly as possible within ten degrees lower and fifteen higher (in the sun) than given. If the nights are still cold, so that the mercury goes near

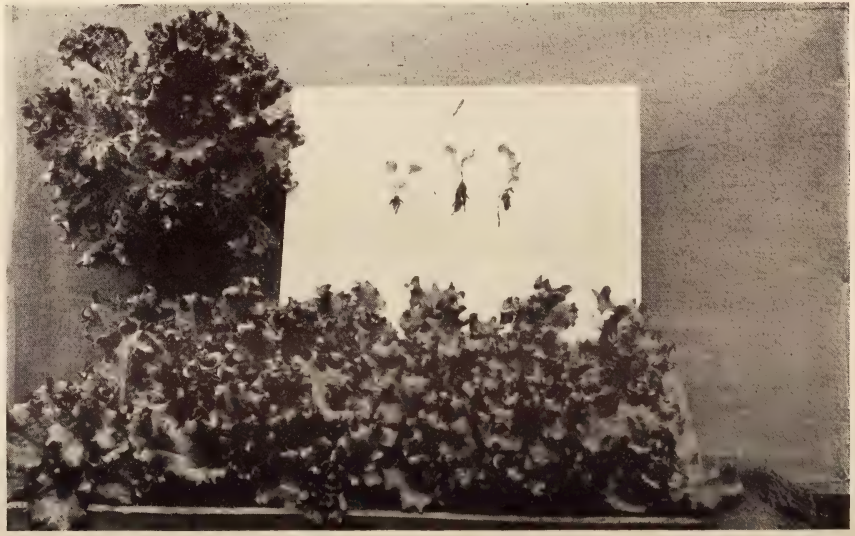
zero, it will be necessary to provide mats or shutters (see illustrations) to cover the glass at night. Or, better still, for the few earliest frames, have double-glass sash, the dead-air space making further protection unnecessary.

VENTILATION: On all days when the temperature within the frame runs up to sixty to eighty degrees, according to variety, give air, either by tilting the sash up at the end or side, and holding in position with a notched stick; or, if the outside temperature permits, strip the glass off altogether, as shown facing p. 75.

WATERING: Keep a close watch upon the conditions of the soil, especially if you are using flats instead of planting directly in the soil. Wait until it is fairly dry—never until the plants begin to wilt, however—and then give a thorough soaking, all the soil will absorb. If at all possible do this only in the morning (up to eleven o'clock) on a bright sunny day. Plants in the seedling state are subject to "damping off"—a sudden disease of the stem tissue just at or below the soil, which either kills the seedlings outright, or renders them worthless. Some authorities claim that the degree of moisture or dampness has nothing to do with this trouble. I am not prepared to contradict them, but as far as my own experience goes I am satisfied that the drier the stems and leaves can be kept, so long as the soil is



(1) Cabbage seedlings just right for transplanting. (2) Stock seedlings—notice mass of rootlets and adhering earth. (3) Seedlings that were too thickly sown and consequently have become lanky. These should be set in soil as deep as indicated by black line.



The whole story: Grand Rapids lettuce seedlings; in flat ready for setting in frames (or outdoors); and a head ready for the table

in good condition, the better. I consider this one of the advantages of the "sub-irrigation" method of preparing the seed flats, described above.

TRANSPLANTING: Under this care the little seedlings will come along rapidly, as shown in the two stages illustrated facing p. 83. When the second true leaf is forming they will be ready for transplanting or "pricking off," as it is termed in garden parlance. If the plants are at all crowded in the boxes, this should be done just as soon as they are ready, as otherwise they will be injured by crowding and more likely to damp off.

Boxes similar to the seed-flats, but an inch deeper, are provided for transplanting. Fill these with soil as described for frames—sifted through a coarse screen (chicken-wire size) and mixed with one-third rotted manure. Or place an inch of manure, which must be so thoroughly rotted that most of the heat has left, in the bottom, and fill in with soil.

Find or construct a table or bench of convenient height, upon which to work. With a flat piece of stick or one of the types of transplanting forks lift from the seedling box a clump of seedlings, dirt and all, clear to the bottom. Hold this clump in one hand and with the other gently tear away the seedlings, one at a time, discarding all crooked or weak ones. Never attempt to pull the seedlings from the soil in the flats, as the little rootlets are very easily

broken off. They should come away almost intact, as shown facing p. 86. Water your seed-flats the day previous to transplanting, so that the soil will be in just the right condition, neither wet enough to make the roots sticky nor dry enough to crumble away.

Take the little seedling by the stem between thumb and forefinger, and with a small round pointed stick or dibber, or with the forefinger of the other hand, make a hole to receive the roots and about half the length—more if the seedlings are lanky—of the stem. As the seedling drops into place, the tips of both thumbs and forefingers, by one quick, firm movement, compress the earth firmly both down on the roots and against the stem, so that the plant sticks up firmly and may not be readily pulled out. Of course there is a knack about it which cannot be put into words—I could have pricked off a hundred seedlings in the time I am spending in trying to describe the operation, but a little practice will make one reasonably efficient at it.

In my own work this spring, I have applied the "sub-irrigation" idea to this operation also. The manure placed in the bottom of the boxes is thoroughly watered and an inch of soil put in and watered also, and the box then filled and the plants pricked in. By preparing a number of flats at one time, but little additional work is required, and the

results have convinced me that the extra trouble is well worth while. Of the early cabbage and cauliflower, not two plants in a thousand have dropped out.

Ordinarily about one hundred plants are put in a 13 x 19 inch flat, but if one has room and is growing only a few plants for home use, somewhat better plants may be had if fifty or seventy-five are put in. In either case keep the outside rows close to the edges of the flats, as they will have plenty of room anyway. When the flat is completed, jar the box slightly to level the surface, and give a thorough watering at once, being careful, however, to bend down the plants as little as possible. Set the flats close together on a level surface, and, if the weather is bright, shade from the sun during the middle of the day for two or three days.

From now on keep at the required temperature and water thoroughly on bright mornings as often as the soil in the flats gets on the dry side, as gardeners say—indicated by the whitening and crusting of the surface. Above all, give all the air possible while maintaining the necessary temperature. The quality of the plants will depend more upon this than anything else in the way of care. Whenever the temperature allows, strip off the sash and let the plants have the benefit of the rains. A good rain seems to do them more good than any watering.

Should your plants of cabbage, lettuce, beets or cauliflower by any chance get frozen, do not give them up for lost, for the chances are that the following simple treatment will pull them through: In the first place, shade them thoroughly from the sun; in the second, drench them with cold water, the coldest you can get—if you have to break the ice for it, so much the better. Try, however, to prevent its happening again, as they will be less able to resist subsequent injury.

In hot weather, where watering and ventilation are neglected, the plants will sometimes become infested with the green aphis, which under such conditions multiplies with almost incredible rapidity. For treatment in this case see page 161.

HARDENING OFF: For five days or a week before setting plants in the field they should be thoroughly hardened off. If they have been given plenty of air this treatment will mean little change for them—simply exposing them more each day, until for a few nights they are left entirely without protection. They will then be ready for setting out in the open, an operation which is described in the next chapter.

STARTING PLANTS OUTSIDE

Much of the above is applicable also to the starting of plants out-of-doors, for second and for succession crops, such as celery and late cabbage. Select

for the outside seed-bed the most thoroughly pulverized spot to be found, enriched and lightened with fine manure. Mark off rows a foot apart, and to the necessary depth; sow the seed evenly; firm in if the soil is dry (facing p. 93), cover lightly with the back of the rake and roll or smooth with the back of the spade, or of a hoe, along the drills. The seed, according to variety, will begin to push through in from four to twenty days. At all times keep the seed-bed clear of weeds; and keep the soil between the rows constantly cultivated. Not unless it is very dry will watering be necessary, but if it is required, give a thorough soaking toward evening.

As the cabbage, celery and similar plants come along it will add to their sturdiness and stockiness to shear off the tops—about half of the large leaves—once or twice after the plants have attained a height of about six inches.

If the precautions concerning seed and soil which I have given are heeded and the details of the work of planting, transplanting and care are carried out, planting time (April) will find the prospective gardener with a supply of good, stocky, healthy plants on hand, and impatient to get them into that carefully prepared garden spot. All of this work has been—or should have been—interesting, but that which follows in the next chapter is more so.