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UNITED STATES SCHOOL GARDEN ARMY

A MANUAL OF SCHOOL-SUPERVISED GARDENING FOR THE WESTERN STATES

By

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PART I. GARDEN LESSONS.

Lesson 1: FIRST, CATCH YOUR RABBIT.

You remember the story of the boy who was telling about the rabbit he was going to eat, and his father said, "Son, first catch your rabbit." Well, that's the way you must do with these school gardens. Before you can eat the crops you expect to grow, you must get the garden.

For you boys and girls living in the country this will probably be an easy matter. Your fathers will be glad to give you a piece of land for your own use, as large as you are able to handle, where you can grow as many kinds of crops as you wish.

For you boys and girls living in the towns or cities it may be a little harder to get get the land for your garden. But many of you will have a back yard of your own where many vegetables can be grown; or your next-door neighbor will be glad to let you use his back yard. At any rate, don't be discouraged if you can't find a place for your garden the first thing. By looking around and sticking to it you will find that there are a great many back yards and vacant lots near your own home which the owners will be proud to let you use after you have told them of the wonderful work the School Garden Army is doing.

If your garden is to be in a back yard, pick out one that is not shaded too much by trees or buildings. Growing things need sunlight and plenty of it. And try to pick out land that isn't all clay or gravel. You can't expect to grow much on soil like that. Ask one of your friends who is a farmer or who has a garden of his own to help you pick out the right place for your garden.

Lesson 2: THE GARDEN SITE.

"Eat well and wisely." Do not allow inferior food to enter the body. Juicy, crisp, palatable, superior garden food can only be grown in fertile soil. The best part of the yard is none too good for the garden site. Consider the suggestions which follow and select the garden site with judgment, and the garden is half done.

Plant needs.—Plants need air, warmth, light, moisture, and food. Bear this fact in mind and govern the garden work so that the needs of the plant will be satisfied. *Consider the needs of the plant first, last, and all the time.*

Nature of soil.—Select a part of the yard which is most sandy in nature, for a sandy loam is warm, porous, and easy to work. Other factors being equal, such as the skill and the equipment of the gardener, vegetables do best in sandy loams. However, an excellent result may be obtained in soils of a clayey nature. Do the best that can be done with the most suitable area. Heavy soil may be improved with lime and manure.

The location.—Sunlight is very important to growing plants. Select an open area as free from shade as possible. Vegetables growing in a shady place usually run to top and therefore store but little food.

Accessibility.—Gardening is *one part of home making.* One should consider this in locating the garden. The garden should be accessible and convenient, yet fit into the general plan of the home. The garden, the hotbed, the cold frame, the tool house, the irrigating plant, should be a compact unit—the whole handy to the back door, for the garden on the farm or in the city is a family affair. It is a place where father, mother, and child *work at odd times.*

Slope and drainage.—Ideally the garden should slope toward the south. Such a plat receives more directly the sunlight and hence is warmer. A sloping area is insured better drainage and lends itself well to irrigation.

The crop system.—Naturally the nature of the crops to be raised will affect the selection of the plat. A small area will serve the table in lettuce, radish, spinach, and the like, while a larger plat may be used for the cash or commercial crops, such as beans, potatoes, etc.

Protection from storms and the larger animals.—Storms and animals reduce the garden output very materially. Dogs and chickens destroy thousands of dollars worth of food every year. Select the area which is sheltered most from storms and which can be fenced most easily if protection from animals is needed. "An ounce of prevention is worth a pound of cure." Be on the safe side if there is any danger from such garden pests; fence the plat.

Lesson 3: THE GARDEN PLAN.

Enthusiastic amateur gardeners, particularly children, are inclined (1) to plant more than the home can use, (2) to plant too many seeds of certain varieties, (3) to pay little attention to succession of crops.

The following table shows one year's vegetable rations for a family of four adults:

Summer of 127 days; rows 24 feet long; winter of 238 days.

	Rows.	Servings.
Peas	7	14
Beets	2	10
Cabbage	[1]15	15
Corn	8	40
Turnip	1	5
Carrots	2	10
Kohl-rabi	1	4
Eggplant	1	25
Cauliflower	[1]15	15
Tomatoes	3	
Okra	2	15
Beans	1	50
Lima Beans	3	15
Squash (Crookneck)	[2]4	36
Peppers	1	25
Beets	2	10
Parsnip	3	15
Salsify	4	20
Carrots	2	10
Cabbage	[1]9	9
Rutabagas	1	18
Onions	4	40

There will be some 175 servings to can, dry, or store.

These figures are based on an average successful garden. The average home gardener should plan to grow vegetables to serve his own home.

The following points should receive consideration in planning a garden:

1. *Size of plat.*—The average boy or girl can easily spade and care for a plat 10 by 30 feet. Such an area will go far to supply vegetables for a family of four. The size of the plat should be such as to produce enough foodstuff to make it worth while and yet not large enough to make its care too much of a task.

2. *Method of irrigation.*—One must determine at the outset whether to use the trench, the flooding, or the sprinkling method. We advise running water in trenches between rows. Plants too close together in rows would be disturbed in making trenches.

3. *Method of cultivation.*—Rows must be farther apart if a horse or hand wheel cultivator is used than if cultivation is practiced with hand tools, such as a hoe or rake.

[1] Heads. [2] Hills.

4. *Accessibility to plants.*—It follows, since plants must receive personal attention, that the plan must take into account ease in reaching all parts of the garden without doing harm.

5. *Rotation.*—Each plant has habits peculiar to itself. One plant may draw heavily on soil potash, another on soil nitrogen. Besides, certain plants grown time after time in the same soil tend to poison it. Your planting scheme should avoid continuous cropping with the same plants.

6. *Continuous production.*—By consulting a planting calendar, and by second and third sowings, it is possible to have a continuous flow of foodstuffs during the gardening season.

7. *Intercropping.*—Every square foot is a food reservoir. Plants which mature quickly may be grown among those which mature slowly. Thus the soil between tomato plants, potatoes, corn, etc., may be made to produce lettuce, radishes, spinach, and the like.

8. *Plants to grow.*—It goes without saying that the kinds of plants grown determine very much the nature of the plan. Radishes and lettuce may be planted more closely together than cabbage and corn. It also follows that corn and carrots, potatoes and beets, should not grow side by side.

9. *Adornment.*—Finally, if one wishes to make his garden not only productive but attractive, consideration must be given to beautification.

ONE-SEASON GARDENS.

30 feet.

10 feet.

Lettuce.[1]—First sowing. Second sowing, other half two weeks later.

Radishes.[1]—First sowing. Second sowing, other half two weeks later.

Spinach.[1]—First sowing. Second sowing, other half two weeks later.

Carrots.

Beets. Level or ridged rows, according to requirements.

Turnips.

Onions.

30 feet.

10 feet.

Potatoes or sweet corn.

Potatoes or sweet corn.—Interplant with radishes, lettuce, spinach, carrots, beets, pumpkins, squash, etc., as one sees fit.

Potatoes or sweet corn.

Potatoes or sweet corn.

[1] Follow with tomatoes or corn, and interplant with pumpkins, squash, lettuce, radishes, etc.

Climatic and soil conditions are so different in the Western States that it is impossible to give definite directions for planting seeds. We suggest that you learn the date of latest average killing frost in the spring and the earliest in the fall.

Hardy vegetables, such as cabbage, beets, onions, smooth peas, Irish potatoes, and radishes, may be planted with little risk some two weeks before the danger period of the average latest killing frost. Carrots, wrinkled peas, spinach, sweet corn, and the like may be planted about the time that the latest average killing frost may be expected, while the warm weather loving plants, beans, tomato plants, maize, pumpkins, squash, etc., may be planted from two weeks to a month later.

TWO-SEASON GARDEN.

1	3	5	7	9	11
2	4	6	8	10	12
(Path or irrigating ditch.)					
13	14	15	16	17	18
(Path or irrigating ditch.)					

3 feet. *Peas*, February. *Follow late beans*, August.

3 feet. *Early Beans*, April. *Follow late Beans*, August.

3 feet. *Early Tomatoes.* Start plants in boxes early. *Follow late Corn*, August.

3 feet. *Early Corn*, April. *Follow late Tomatoes*, August. Start plants earlier for transplanting.

14 inches. *Transplanted Lettuce for winter use after Pumpkins. Transplanted Onions for winter use after Squash.*

1. Lettuce (February), follow radishes. 2. Second sowing two weeks later. 3. Radishes (February), follow lettuce. 4. Second sowing two weeks later. 5. Spinach (February), follow turnips for greens. 6. Second sowing. 7. Turnips for greens (February), follow spinach. 8. Second sowing. 9. Onion seed for transplanting, or sow sets. Follow lettuce for transplanting (February). 10. Second sowing. 11. Beets (February), follow carrots. 12. Second sowing. 13. Lettuce or spinach or radishes (February), onion seed for transplanting (August). 14. Kohl-rabi (February), follow turnips (August). 15. Turnips (February), follow kohl-rabi (August). 16. Carrots (February), follow beets (August). 17. Carrots (February), follow beets (August). 18. Beets (February), follow carrots (August).

With water for irrigation, the period between late July and early August is the second spring. Plant at this time as though it were February. Flood plats thoroughly, using a hose or trenches, before sowing seeds. Soil moisture to the depth of 2 feet is the trick in fall gardening.

Each small plat should be surrounded with a levee a few inches high in order that the gardens may be flooded. As soon as a plat is harvested, replant. Plant seeds in rows, as the soil should receive regular cultivation.

In the fall it is often a good plan to plant seeds on ridges, as the raised plat is warmer and less liable to water-soak than the level one. This plan is for valleys of California. Modify as necessary for your district. Learn frost dangers in your locality and plant accordingly.

ANOTHER TWO-SEASON GARDEN PLAN.

40 feet.

3 feet. Rhubarb.	Asparagus.	
18 inches. Lettuce, 2 sowings, 10 days apart, follow with spinach.	Spinach, 2 sowings, 10 days apart, follow with lettuce.	
18 inches. Carrots, follow with beets.		
18 inches. Beets, follow with carrots.		Squash.
18 inches. Turnips, follow with onions.		
18 inches. Onions, follow with turnips.		
18 inches. Kohl-rabi, follow with radish.	Radish, follow with kohl-rabi.	
2 feet. Dwarf beans, consecutive sowings.		Cucumbers.
4 feet. Cabbage.		
2 feet. Peppers.	Celery.	
5 feet. Tomatoes.	Pole Beans.	
3 feet. / 2 feet. Sweet corn, early and late varieties (two rows), consecutive sowings.		

20 feet.

Lesson 4: THE SEED.

The seed contains the plant which is to help in producing the crop. Its parentage is very important. No matter how well prepared the seed bed, poor seed results in failure of the crop. Ideally, the gardener and the farmer should select their own seed from their own plants at harvest time. Such seed should be selected from parent plants nearest to type, vigorous, bright, and otherwise showing superiority as they *grow in the field.* Selected seed stored carefully to prevent fermentation, heating, freezing, and insect attacks, planted in a well prepared seed bed at the proper time, will come true to type and produce abundantly. It is on record that careful seed selection from his own field by a high-school boy raised the yield of Milo "maize" from 1 ton to the acre to 5 in five years.

Most seed companies are reliable. Yet there is a possibility that seeds have lost their vitality through age and handling. The grower can not take chances. He must safeguard his crop. Therefore, after sifting the larger seeds through screens, he should test samples before planting. Possibly the best method is the "rag doll" test. Sterilize a piece of muslin (8 by 16 inches is a convenient size) and a fruit jar with hot water. Lay the cloth flat on a clean table. Count out 50 or 100 seeds of the lot you wish to test. Roll them into the cloth until they are covered. Add another set from another lot and roll. Continue until all samples of all the

lots of seeds are inclosed. Fold the ends of the roll toward the center; place in the jar. Add a small amount of water to keep the rag moist. Perforate the top of the jar and screw it on. Place in a warm place. Keep a record of the date. In a few days unroll the doll carefully and examine the seeds. If the germination process is not far enough along, return it to the jar. Note carefully the germination power of the seeds from time to time. Good seeds germinate equally, quickly, vigorously. Discard seeds which show signs of low vitality.

It is true that plump, bright, large seeds may be full of vitality, yet, without the test, there is a large possibility for crop failure.

Seeds should be purchased early from reliable seed houses, or, better, selected at harvest time from the field.

Lesson 5: GETTING SEEDS FOR THE GARDENS.

Superintendents, garden supervisors, and teachers should arrange for seeds at the earliest possible moment. Arrangements should be made to insure their purchase sometime before the time needed. Some one person should be selected who will be responsible for this matter. It is extremely important to the success of the United States School Garden Army movement that good seeds be procured for the garden army. The supply is limited and failure to act promptly may result in failure.

There is no provision made for the furnishing of seeds through the Bureau of Education. In many cases, however, teachers can secure supplies of seeds for their pupils by writing to the Congressmen from their districts. Many teachers have found that it is a good school exercise to have their pupils address such requests to the Congressmen, and many Congressmen have willingly furnished such seeds to the pupils. Senators and Representatives in Congress must have their requests for seeds in by March 1.

The principal supply of seeds, however, for your garden army this season must be the commercial seed houses, and early arrangements should be made with them. As there may be a shortage of seeds this year, care should be exercised in not ordering more than can be economically used in effective food production.

Lesson 6: THE SEED BED.

A plant needs air, moisture, food, light, warmth. Therefore, an ideal seed bed must be a reservoir for air, moisture, food, and warmth. It must be open to sunlight.

Selection.—Select an open, sunny, fertile spot. Avoid ground which has been seldom worked or which you know to have been overgrown with such weeds as Bermuda Grass, Johnson Grass, or wild morning glory. It is nearly impossible for the average boy or girl or adult to compete with such pests.

Preparation.—In many parts of the Western States the soil is so fertile that it is not necessary to add plant food. However, most vegetables are heavy feeders and delight in soil made rich with such foods as are found in manure—chicken, hog, sheep, horse, cow, and commercial fertilizers. Manure should be worked into the soil during the fall or early spring. Such treatment, followed by spring spading or plowing, puts the soil in ideal shape. However, in the spring spade the soil deeply if it is moist; rake thoroughly while the soil is moist, for vegetable seeds are small and need a fine, open seed bed. If clods persist, rake them into a pile and bury them. Spading and raking open the soil so as to insure plenty of air, food, moisture, and warmth. The seed bed should be fine, yet firm, with a dry mulch of soil on top, slightly raised in the center, if level cultivation is practiced, and sloping gently to all sides.

At this time, if one intends to use the sunken garden (see lesson 2) or the ridged row plan, the soil should be so prepared.

Lesson 7: TOOLS.

Efficient tools are as useful to the gardener as to the carpenter or any other worker. Good tools take much of the drudgery out of gardening.

Rakes.—Probably the best rake is the new adjustable type, which may be widened or narrowed at will. However, a rake a with a 12 to 16 tonged head will do.

Spades.—For young children, the tool known as the "woman's spade" is the best. Adults should use a full-sized spading fork or the common type of spade.

Hoes.—Buy substantial full-sized hoes for both children and adults.

Wheel tools.—No garden larger than an area 10 by 30 feet is efficiently equipped without wheel tools. A wheel tool increases one's efficiency many fold. Such a tool appeals to children particularly. A wheel tool is inexpensive and has adjustable attachments for plowing, weeding, and cultivating. For large gardens a wheel planter serves an excellent purpose.

Miscellaneous tools.—The Marker: Many gardeners use a homemade marker for laying out rows. This is made by inserting a handle in a cross bar 4 feet or so long, which has holes at regular intervals a few inches apart. Thus the gardener has a tool resembling a rake with the teeth the distance apart the plants are to stand, which he drags across his seed bed.

The straightedge.—A 4-inch board 16 feet long does very well as a straightedge. The point of a hoe drawn along this edge insures a straight seed trench as deep as one desires.

Strings and stakes.—Some gardeners prefer to lay off the rows with strings attached to two stakes. The string is drawn tight and the stakes are pushed into the ground. With a hoe or rake the trench is opened.

Trowels, stakes, etc.—Trowels, stakes, and material of a similar nature should be assembled for the garden season.

The blower and sprayer.—For protection against fungi and insects the gardener should have on hand a simple bellows for dusting insect and fungous powders freely over plants.

A suitable hand sprayer for a small garden may be purchased for 50 cents or $1.

Care of the tools.—Children should be urged to care for their tools. They should be repaired as necessary, kept clean, and in a convenient place.

NOTE.—Advise the boys and girls to buy man-sized substantial tools.

Tools may be protected through the winter by dipping the metal parts in crude oil or covering them with grease.

Rust may be removed by soaking the metal parts in kerosene. Follow with brisk rubbing. Tool blades may be scoured with a portion of brick.

Lesson 8: USE OF TOOLS.

The efficient worker wastes few movements. There is a right way to use garden tools.

Spading.—Use the trench method of spading. Dig a row across one end of the garden as deep as the spade blade. Throw the dirt forward, leaving a trench. Step back and spade another row throwing the dirt partly into the trench. Continue spading back and fourth, keeping a trench open.

This method insures thorough spading of every foot. The soil as it lies partly in the trench and partly on the loose surface may be easily fined by a stroke with the flat surface of the spade blade. Labor is saved, for the dirt breaks away easily as the spade is inserted. The soil is lifted but once. In the method so common, namely, to turn the spadeful back in the place from whence it came, not only are clods turned under and small portions of the garden missed, but the soil is lifted a second time when the next row is spaded. Thus the labor is increased.

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The spade should be driven straight into the soil as far as it will go. If the soil is hard the spade may be started by tipping and pushing it in corner first.

The spadeful of earth should be fined as fast as it is lifted. In a few minutes the clods may dry out and become a nuisance during the garden season.

Subsoiling.—When the soil permits, it is advisable to practice subsoiling. With a trench open (trench spading), push in the spade blade. Twist and turn it. Continue working the soil in the bottom of the trench until it is thoroughly stirred. As each successive trench is opened, continue the process. Thus the soil will be stirred two spade lengths deep. Air and moisture will circulate freely. Plants will develop a large root system and a good crop is insured with ordinary care.

Raking.—Raking is a simple process if the trench method of spading has been used and the soil fined as each spadeful of dirt has been turned. Push and pull the rake until the garden is well fined and shaped. It ought to slope gently from the center to the edges. Children are inclined to pull the soil toward them, thus making the garden low in the center.

Hoeing.—Hoes and rakes should never be swung higher than the knees and hips. Children often swing them over the head. Many tools are broken and serious accidents have resulted.

Cultivating.—In cultivating with a hoe, one must be careful not to disturb the plant roots. Cultivation close to the plant should be shallow.

Weeding.—The hoe is the best tool for removing weeds. Cut them out as fast as they appear.

Lesson 9: IRISH POTATOES.

Every home garden should have its "spud" or potato patch. The potato is a basic food. It not only substitutes well for wheat foodstuffs but is found on every table in the land. Besides, potatoes are easily grown by the amateur gardener. However, no plant responds better to careful seed selection and attention to growing methods. Reasonable cultivation and irrigation when necessary bring remarkable returns.

The seed bed.—The food part of the potato plant develops beneath the soil; hence the soil must be open, and of a sandy nature. The expanding potato fails to reach a marketable size if the soil stiffens or packs. The seed bed, for best results should be manured and plowed or spaded deeply in the fall. A second plowing or spading early in the spring, with thorough cultivation, prepares an ideal seed bed. If fall preparation has not been given, plow or spade under weeds and trash several weeks before planting, in order that the same may decay and that the soil may settle.

Purchase of seed.—Ideally, the grower should select his seed from his own field from hills which show superiority both above and below the ground. So little attention has been given to selection of seed that in some communities the average acre production has decreased materially. Buy selected seed early from a reliable seed house. It costs more, but it is money well invested. Poor seed promises a poor crop at the outset, and such a promise is redeemed.

Treatment of seed.—Potato diseases have developed very rapidly in the last few years, due to continuous cropping in the same soil and careless handling of seed. Such diseases may be largely prevented by dipping the seed in a formalin solution to kill disease spores which cling to the seed.

Potatoes propagate through the "eyes." Such an eye will grow under proper conditions, but the young plant will seldom reach the surface unless prepared food is close at hand to sustain it; hence the principle underlying the sectioning of a potato is to cut a section large enough to hold moisture and to sustain two eyes a considerable period of time. Two ounce sections to two eyes is the usual rule. Most growers cut potatoes into one quarter sections, depending on the size of the potatoes.

Planting.—Open a hole with a spade, drop in a section or two, depending on their size, cover and step on the hill. If potatoes are grown on a large scale, furrows may be opened with a plow and the seed covered with the same implement. Plant seed, before it has dried out, about 4 inches deep, 12 to 14 inches apart in rows. The rows should be about 3 feet apart. Rake or harrow the surface and scatter on top a thin layer of manure. This will tend to conserve moisture and as the rains fall plant food will be delivered to the plants. Avoid direct contact of manure and potatoes.

Cultivation.—It is safe to rake or to harrow lightly before and after the young plants are up even after several leaves are formed. Later cultivation should be shallow since the developing potato and the surface feeding roots are often destroyed by deep cultivation. The grower wonders at his small harvest in this case. Where there is danger of sunburn, it is a good plan to bank soil carefully against the young plants. Cultivate often and *carefully.*

Irrigation.—Where irrigation is practiced, we suggest running water regularly in trenches between the rows. Small amounts at frequent intervals of a week or two are better than larger amounts less often. Each irrigation should be followed by cultivation.

Spraying.—Insects found on the outside of plants may be divided into two classes—those with mouth parts built for sucking, and others with mouth parts constructed for biting. Insects of the first class must be sprayed directly with a "contact" spray containing "Black Leaf 40," whale oil soap, or other material of a like nature. The other class may be controlled largely through sensible use of "stomach" poisons such as arsenate of lead, etc. If insects appear, examine the mouth parts and spray accordingly.

Plant diseases, such as blight, may attack the potato plants. Spraying often, every two weeks or so with "Bordeaux Mixture" may make the crop safe.

NOTE.—Young potato plants may often be saved from frost by covering with dirt, fruit cartons, and the like.

In treating seed to prevent potato scab, put the potatoes into a clean sack and soak for two hours in a solution containing formalin about one-half cup to seven gallons of water. Dry and plant.

Lesson 10: USE OF FORMALIN AND BLUESTONE.

Potatoes have been grown so long and with so little regard for fungous diseases, the output of first class tubers is limited. Infected seed potatoes are common. The average gardener does not detect defective potatoes. Infected seed not only reduces the crop but contaminates the soil for a long time. It costs little to secure the crop against disease.

The formalin treatment.—Obtain from a druggist a half-pint of formalin (40 per cent solution). Add this to 50 gallons of water and stir thoroughly. Put as much as needed into a barrel or tub and soak the potatoes whole for two hours. After this treatment dry the potatoes, section and plant them as desired.

The formalin does not deteriorate rapidly and may be used to treat many different lots of potatoes.

The amount of solution may be reduced proportionately if 50 gallons are not needed.

Wheat and corn are often treated in a somewhat similar way to destroy fungi. Such seed is spread usually on canvas and sprinkled freely with the solution. The seed is stirred thoroughly during the process until every seed is moistened. After the seed is dry it is ready to plant.

NOTE.—Do not grow potatoes in soil which is known to be contaminated. Such soil must be used for other purposes for several years.

Bluestone may be used if formalin is scarce.

Lesson 11: PUMPKINS.

Varieties.—The most common variety planted to furnish material for pies is the Connecticut Field. The "Mammoth King," or the common "field," suits the purpose for stock feed. However, delicious pies may be made from "stock" pumpkins.

Wants peculiar to the pumpkin.—The pumpkin delights in warm weather. It is a rich feeder. It has an extensive root system which demands a loose, sandy loam.

Preparation of seed bed.—Ideally, fall plowing or spading and fertilization with manure should be the practice. The ground should be plowed and spaded again early in the spring. This thorough stirring insures plenty of moisture and extensive area for the far-reaching roots. Many growers unfortunately do not care to give the seed bed so much attention. A grower has little control over climatic conditions, but he can be master of his seed bed and seed. The grower should make safe his pumpkin crop with an ideal seed bed.

After the spring plowing or spading, he should harrow or rake the soil often to kill the young weeds as fast as they form and to conserve the moisture. This treatment should continue until the weeds have been destroyed and the bed is mellow and moist a few inches below the surface.

Planting.—Pumpkin seed should never be planted until the ground is warm and the danger of frosts is over. Nothing is gained by early planting, and much is lost. When ready to plant, scrape away the dry mulch with a hoe and stir the moist soil a few inches deep. Insert 3 to 6 seeds an inch or so deep in the moist earth and pack the soil lightly with the blade of the hoe. This causes the soil moisture to rise. Cover with the dry mulch. This prevents the escape of the moisture. If the seeds are good and the soil is moist and warm, the plants will appear in from 3 to 7 days. Continue planting in hills 6 to 8 feet apart.

Since pumpkins may be sown rather late, they may be planted among corn, potatoes, or the like after such plants have obtained a good start.

Later care of plants.—Eternal vigilance is the price for successful development of any young plant. Lift the new leaves and look for insects. If any are found, pinch them to death. This may be a little repulsive, but it is a quick and practical way to stop the attack of plant lice. A little soap and water will remove stains from the fingers. Note the appearance of the leaves. If they appear to be eaten into, stir the soil close around the plants and look for cut "worms." They are not worms, however; they are the larvæ of moths. If any are found, destroy them.

After the danger of cut "worms" has passed, thin out the plants, allowing but one or two to stand. Cultivate carefully and often. Avoid destroying the surface roots through deep cultivation. Examine the leaves often for plant lice. Do not let them get a start. Unless the rainfall amounts to 15 inches for the season, it is advisable to irrigate. Run water in ditches close to the plants, if the field is an extensive one and water is plentiful. Otherwise, dig trenches around each hill, fill with water, and cover after the water has soaked in. A nice way to irrigate just a few hills in the garden is to sink a can, perforated at the bottom, near each hill. Fill the cans as needed. A little manure water added at irrigation will give excellent returns. To insure large pumpkins, it is a good plan to cut back the long runners to 4 feet. The best pumpkins are borne close to the stalk and not on the long runners.

Harvest time.—Harvest before the "frost is on the pumpkins." In cutting them from the vines leave 4 or 5 inches of stem. Select the best pumpkins from the most productive vines for seed and store them all in a dry place safe from frost.

The seed.—Open the pumpkins, pull out the seeds and put them into a pail of water. Stir them vigorously to free them from the stringy fibers. Strain them and dry. Select the brightest, plumpest seed and store them away for the coming season.

Use.—A few small pumpkins will furnish pies for the winter. The rest may be fed to stock, pigs, cows, horses, and chickens. They may be fed whole to pigs and horses. For cows, chop the pumpkins into small pieces. Pumpkins cooked with other foodstuffs make an excellent winter mash for chickens.

NOTE.—To make manure water, put manure in a sack and suspend it in a barrel of water. Regulate the proportions until the color of the water is like weak tea. Add to plants as you desire. An interesting and profitable way to grow pumpkins and other plants of a similar nature—melons, squash, cucumbers, etc.—is to make a tub or barrel garden. Fill a tub with a rich soil and plant the seeds. Apply manure water regularly. The products will surprise you. It is on record that a gardener grew 400 pounds of pumpkins in a barrel cut in two. Such a novelty garden may be started anywhere, even on the back porch. It will furnish pie stuff for some time.

Melons, cucumbers, and squash are treated very similarly to pumpkins. If one is in a hurry to get the young plants up, soak the seed until they begin to germinate. Then plant. The water should be changed every day to prevent fermentation. Keep the seed moist but not covered with water. It takes about 8 ounces of seed to plant 100 hills.

Lesson 12: IRRIGATION.

A gardener can be master of his seed bed, his seed, and his tools, but he has no control over weather conditions. Plant food must be in solution for use. The large problem in plant growth is an abundance of water in the soil at the proper time.

The garden output is often limited by inadequate rainfall. In fact the ideal place for gardens is the locality with little rainfall and a plentiful supply of water for irrigation. In such a locality soil water conditions may be controlled.

An irrigating system to a grower is like insurance to the business man. Such a system safeguards the crops. Besides, with an adequate supply of water, the soil may be made to produce at its maximum possibilities.

The overhead sprinkling system.—Where the home is supplied with city water or its own water plant, water may be led to the garden with a hose. To spread the water over the garden, there are many types of sprinklers. The best method for distributing the water is through water pipes in 16 foot lengths, which may be coupled together easily. The pipes should be bored and threaded at regular intervals. Small nozzles should be screwed in. This apparatus may be mounted on stakes with a V-shaped notch in the end. When the water is turned into the pipes it is thrown from 15 to 25 feet in any direction, depending on the way the nozzles are faced. The direction may be changed by turning the pipes on the supports. Such a system is not expensive. It may be moved easily or kept permanently in one place. One 16 foot length waters an area 16 feet long and 50 feet wide. It distributes the water gently, evenly, and thoroughly. Sprinkling, to be successful, must be thorough enough to force water far into the soil, otherwise surface roots form and the garden output is not satisfactory.

Children seldom irrigate successfully with the sprinkling method. We do not advise the use of this method unless the apparatus suggested above is used or the hose with its nozzle is allowed to play freely until the ground is thoroughly moistened several inches beneath the soil. Sprinkling little and often limits crop production very much.

The trench system.—Trenches should be dug close enough to the rows so that the water will serve the plants and yet so the trenches will not disturb the roots. With a hose, surface jointed pipes, a flume, or a ditch, water may be run into the trenches as often as needed. This is the best system for amateurs to use, since the water is below the roots and insures a deep-root system. The trenches should be covered after irrigation.

The flooding system.—Truck gardeners use the flooding system successfully if the soil is sandy in nature. The garden should be laid off in checks 4 by 5 feet with a small levee around each. A trench should be made between every two rows of checks to deliver water to each. As needed the water should be run down the main trench. By making small earth dams the water may be forced into the checks. In this way an adequate amount of water is insured each plant.

Subirrigation.—Probably subirrigation is the most successful method of applying water. The method involves little labor. The system, while rather expensive to install, is permanent and needs little attention while in use. The water reaches the roots from below. The soil never bakes.

Trenches are dug 18 to 24 inches deep across the garden and about 3 feet apart. In these short tiles are laid, end to end. At certain places the tiles are brought to the surface. Water is turned into these. It escapes between the tiles, climbs in the soil, and is used by the plants.

Use tin cans.—A practical way to irrigate plants such as pumpkins, tomatoes, cucumbers, etc., is to perforate tin cans near the bottom, sink them close to the plants, and fill them with water. Thus water is furnished the plants in abundance *from below.*

After care.—In every instance cultivation should follow irrigation as soon after the water is applied as possible.

NOTE.—Variations of the above irrigating systems may be made at will.

Lesson 13: SWEET CORN.

Sweet corn is not hard to grow. Try it in your gardens.

Varieties.—Early Mammoth is medium early and a good table corn. Country Gentleman and Golden Bantam are the best known and the best liked of the sweet corns. The Country Gentleman is a late variety. The Golden Bantam is early. The kernels are very sweet and tender, even after the corn is a little old. Probably the Country Gentleman is the best all-round sweet corn.

Particular wants.—Sweet corn is a warm-weather-loving plant. It desires rich food. The root system is very extensive and keeps rather near the surface.

Preparation of the seed bed.—Prepare as suggested for potatoes and pumpkin, Leaflets 3 and 5. Be thorough in preparing the seed bed for corn.

Planting.—Plant tested seeds in rows 2 or 3 inches apart and about 2 inches deep, depending on moisture conditions. Plant more deeply if soil is dry. Plant less deeply if soil is moist. Plant so that the rows are about 3 feet apart. While sweet corn is a warm-weather plant, it may be sowed about the time the last average killing frost may be expected or a week earlier. Make a second and third planting.

LATER CARE OF PLANTS.

Cultivation.—With a harrow or rake go over the field or garden before the plants appear. Corn may be safely harrowed (teeth set back at angle of 45 degrees) until it is several inches high. Harrow crosswise in the afternoon, since the plants are not quite so liable to injury during the heat of the day. A few plants will be hurt, but if the stand is a good one little damage is done. Any injury is far overbalanced by the moisture saved and by the elimination of weeds. Later cultivation must be shallow. As the plants grow to maturity the surface-feeding roots meet in the spaces between the rows and are but a few inches beneath the soil.

Thinning.—Thin the plants to 12 or 16 inches apart.

Irrigation.—Where irrigation is practiced, and it is needed usually for sweet corn, plant the seeds along the edge of raised rows. Water may be run in the trenches between the rows. If the sprinkling system is used in the garden, keep the seed bed level. Cultivate carefully soon

after the condition of the soil will allow it. Better still, scatter pulverized manure—street sweepings or such as may be found in a corral—around the plants and sprinkle. The water will carry the food elements in the manure to the plants and little cultivation will be necessary. Follow this suggestion in irrigating other plants with the sprinkling system, or if a fall garden is started.

Harvesting.—Select the best ears from the plants in the field that are most productive and the nearest to type. Hang the ears in a dry place for the following season's seed. If successive plantings are made, the garden ought to furnish sweet corn for the table over an extended period.

NOTE.—Do not plant so much corn or any other garden stuff that there will be a waste. In some parts of the Western States sweet corn may be planted in July for a second crop.

Lesson 14: THINNING.

Garden seeds are so small that there is a tendency to sow more than is needed. Boys and girls are inclined to reason that if a seed produces a plant, why not sow many seeds and obtain many plants. Invariably if weather conditions are favorable, if the seeds are good, and they were planted the right depth, thinning is necessary.

Reasons for thinning.—Plants of the nature of beets and turnips will twine about each other unless carefully thinned.

Plants too thick in a row suffer from lack of food and water. Many die, others run to spindling tops. Root vegetables can not develop beneath the surface of the soil.

Crowded plants harbor insect pests. They hide between the plants and are hard to find or to reach with a spray.

One vegetable fully developed is worth a half dozen inferior specimens. In the process of thinning, the weak and undesirable plants may be eliminated.

When to thin.—It is advisable to go over the rows as soon as the plants have set their true leaves—about an inch in height. Thin the plants to half the distance they are to stand at maturity. By thinning early the plants are not set back by lack of food and moisture. The removal of a tiny plant does not disturb the adjoining one.

As soon as the plants are well established, 2 or 3 inches high, proceed as before, thinning the plants as they are to stand at maturity.

How to thin.—Stand astride the row and pull the plants carefully, leaving one to a place. In removing one be careful not to disturb the other. In so far as possible, remove weak defective plants.

In a large garden a hoe may be used to thin beets, turnips, etc., into bunches which may be thinned later by hand.

A rule for thinning.—Generally speaking, plants should stand as far apart as the diameter of the root—root crops; and the diameter of the head—lettuce, cabbage.

NOTE.—The plants that are discarded in thinning may be used to replant missing places or served on the table as greens.

Lesson 15: RADISH—LETTUCE—SPINACH.

(Quick growing—Hardy vegetables.)

These vegetables are easily grown. Through successive sowings and interplanting they may be raised to serve the table continuously during the season. They are admirable foods, because they furnish the bulk and valuable mineral elements. Lettuce and spinach particularly should be found on one's table very often.

RADISH.

Varieties.—We advise for early spring and summer the Scarlet Turnip White Tipped, the Long Scarlet, and the Icicle. For fall and winter sowing use Chinese White Winter and Long Black Spanish. The first-named varieties grow rapidly; the second grow more slowly, and are, therefore, more suitable for late planting.

Special needs of the radish.—Radishes need a warm, rich, sandy loam and moisture close to the surface in order that they may develop quickly. Pithy, strong radishes are due to slow growth and age.

The seed bed.—See Lesson 5. There is this one caution, however, and it holds in planting small seeds of this type. The seed bed must be *firm*. Many gardens fail to produce, because seed are planted in loose soil immediately after spading. The soil dries out rapidly, and but few plants are harvested. Firm the soil by rolling, if seeds are to be planted directly after spading, or press down the soil after sowing.

Planting.—Make a rather wide, shallow trench not more than an inch deep. Scatter seeds about an inch apart sidewise and lengthwise of the trench. Cover and press down the soil by walking on a board covering the row or by using the head of a hoe or rake. Rake loose soil over the packed areas. One-half ounce of seed will sow a 50-foot row.

Later care of plants.—Thin them early to 1 or 2 inches apart. Cultivate often and irrigate in trenches if necessary.

LETTUCE.

Varieties.—There are two general types—nonheading and heading. The first type is well represented by Black-seed Simpson and the Prize Head. The Hanson and Los Angeles represent best the heading type. We advise Hanson for the amateur gardener.

Special needs of lettuce.—To do its best, lettuce must have a rich, moist, firm seed bed. It delights in cool weather. Seldom can one grow lettuce successfully during the hot summer.

The cultural methods as followed by the average gardener are very similar to those suggested for radish. It is self-evident that the heading type must be thinned early to a distance equal to the diameter of the mature head, from 6 to 8 inches.

Special cultural methods.—To grow large heads with crisp, tender leaves, special care must be given. Transplanting seems to improve certain vegetables, such as lettuce, cabbage, and onions. Sow lettuce seed in a hotbed or cold frame for early plants. Seed may be broadcasted in the open for a later crop. As soon as the young plants are 2 inches or so high, transplant them to their permanent place. Cultivate often and force their growth with water and fertilizer. A spoonful of nitrate of soda worked into the soil carefully around each plant insures superior lettuce.

Some growers shade lettuce in frames covered with cheesecloth. Such a frame serves a double purpose, (1) insures tender leaves and (2) protects from the cold.

One-fourth ounce of seed will sow a 50-foot row.

SPINACH.

Varieties.—The best varieties are the Prickly Winter, Bloomsdale, and Savoy. The first variety is best adapted to fall and winter sowing.

Special needs of spinach.—It is a surface-growing plant, a rich feeder, and does best in cool weather; hence the seed should be planted shallow (depending, of course, on the moisture contents of the soil) in a firm, moist, mellow seed bed, during spring and fall. Spinach needs much moisture. There is little danger of keeping the soil too moist.

Planting.—It may be planted broadcast or in rows. Most growers prefer the latter method, as the plants are more easily cultivated. Sow the seeds about 1 inch apart and thin the plants later to 4 inches or so. One ounce of seed will sow a row 100 feet in length.

Later care of plants.—Irrigate and cultivate often.

Lesson 16: TRANSPLANTING.

The most successful grower is familiar with the habits of plants. This information he uses as he works with them, and they respond to his will. Among other things the grower has learned that through transplanting he (1) can move plants from a crowded area to one with a poor "stand," (2) can have an early garden by moving plants from flats, hotbeds, and cold frames that were started early in the season, (3) can make weak plants sturdy, (4) can retard plant growth.

Preparation for transplanting.—The day before transplanting it is advisable to moisten the soil in which the plants are growing and where they are to be moved, unless rains have accomplished the latter purpose. Thus they become filled with water and are better able to withstand the short period of drought before adjustment to the new conditions takes place.

Transplanting.—Make a hole large enough to receive the root system of the plant to be moved, without crowding. With a trowel or sharp piece of shingle remove the plant carefully, so as not to disturb the soil which clings to the roots. With one hand hold the plant in place; with the other pack the soil lightly around the roots. Before the hole is filled, pour in a liberal amount of water. As this soaks away fill the hole with dirt.

Small plants may be "pinched" in with the thumb and index finger of each hand. Sometimes deep trenches are made and filled with water. Soon after, plants are laid in place in the trenches. The trench is then closed.

To transplant from pots, place the hand over the top of the pot. Allow the plant to extend between the fingers. Invert the pot and strike it sharply on the top of a post or the heel. Plant and soil will drop into the hand. The whole mass may be put into the hole prepared for it. Add water.

Protection from sun.—Shade the plants with a shingle or cheesecloth frame. During the period of readjustment the plant needs assistance.

NOTE.—Some growers prune back the tops and roots before replanting. The best time to transplant is on cloudy days or late in the afternoon.

Lesson 17: CARROTS—BEETS—TURNIPS.

(Hardy, root-type vegetables.)

The cultural methods for these popular vegetables are very similar.

Varieties:

Carrots: Use Danver's Half Long, Long Orange, Oxheart.

Beets: Grow Crosby's Egyptian, Improved Blood Turnip.

Turnips: Select Early White Flat Dutch, Purple Top, White Globe.

Special needs.—Carrots, beets, turnips are rich feeders and store their food elements in their root system; hence the seed bed should be well fertilized (some time before planting) and the soil should be sandy in nature in order that the roots may expand easily as they grow.

Planting.—Sow in rows 12 to 14 inches apart. Space the seed in the rows about 30 to a foot. Plant the seed from one-half to one inch deep, depending on the soil conditions.

Later care of plants.—Cultivate often and irrigate as necessary, using the trench method. Thin out the plants early and carefully. If thinning isn't practiced, the roots will wind about each other.

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Insect pests.—Carrots and beets are seldom hurt by insects. However, soil which has been cropped continuously with the root-type vegetables may become infested with animals which attack the roots. Plant lice are a severe pest on turnips. Tops of turnips may wilt in a day, although the soil is moist. On examination the leaves may be found covered with insects on the under side. Prevention is the only cure. Examine the young turnip plants early and destroy all the plant lice. Of these three vegetables, turnips love cool weather best; hence the fall-sown crop gives surest returns.

Seeds.—For a 50-foot row, sow one-half ounce of carrot seed, 1 ounce of beet seed, and one-fourth ounce of turnip seed.

Lesson 18: TOMATOES.

Varieties.—Chalk's Early Jewell, Stone, and Trophy are the best.

Special needs of the tomato.—This plant does best in a rather deep sandy loam. It is an average feeder and does well with a limited amount of water. Given warm weather this plant is not so particular as to soil conditions as others.

The seed bed.—Prepare as suggested for other garden plants. Be sure that the seed bed is mellow and firm.

Planting.—Move the young plants when they are 5 or 6 inches high from the "flat" or bed in which they were started to the garden soon after danger from frost is passed. Plant them about 3 or 4 feet apart in rows. Allow about the same distance between rows. If the plants are to be supported or pruned to one or more leaders, they may be grown more closely together. It is not advisable to plant seed directly in the garden.

Cultivation.—Cultivate more and irrigate less is a rule worth applying in the culture of tomatoes.

Irrigation.—If irrigation is necessary, make trenches around each plant far enough away to avoid root injury. Fill the trenches with water and cover as the water soaks away. Be cautious in irrigating, as tomatoes are more easily hurt by too much water than by too little; particularly is this true at blossoming time. Heavy irrigation at this period may cause the blossoms to drop.

Pruning.—Many growers prune their tomato plants, allowing but one or two leaders to develop. These are trained to strings, sticks, or some other support. With adequate irrigation and fertilization, immense tomatoes are produced.

Fertilization.—Soils naturally rich, or made so with nitrogen, often cause tomatoes to run to vines. Therefore one must use manures with care.

Protection from frost.—In order to have early tomatoes, many growers set out their plants before the danger from late frost is over. The plants may be protected with newspapers, sacks, and cheesecloth on frosty nights.

Preservation of tomatoes.—Besides canning as a means of preserving tomatoes, they may be had fresh far into the winter. Before the first killing frost in the fall pick all the green tomatoes. Wrap each in paper. Place them in a dry cool place. Two or three days before the fruit is to be served, expose a few specimens to the light. They will ripen and serve all the purposes of fresh tomatoes.

Lesson 19: SUPPORTING PLANTS.

Farmers and gardeners are learning to increase the depth of their gardens. They are plowing and spading more deeply. By supporting plants the height of the garden may be raised and the surface increased. No longer is the garden production limited to surface area. The garden may be enlarged both downward and upward.

Hoop support.—Tomatoes, whether pruned or not, should be supported. This treatment not only keeps the fruit clean, but it conserves space, for the plants may be set more closely together. Nail three stakes to hoops. Slip the hoops over the vines before they begin to spread.

Tree guards.—Wire tree guards answer the same purpose. These may be purchased or made at home. Cut four stakes 4 feet long. To these tack chicken wire, enough to inclose a tomato plant. Before the vines begin to spread, place the supports over the plants. For cucumbers the support may be made like a tent, closed at the top.

Use of stakes.—Tomato plants pruned to one stem may be supported by a strong stake. If two or three stems are left, a ladder-like support may be made and the stems attached like a fan to the cross bars.

Pole beans may be trained on four stakes placed in as many hills in opposite rows and tied together at the top like a "tepee."

Some growers stretch a strong wire between two poles 6 feet long placed at the opposite ends of a row. Strong cords are dropped from the wire and fastened to stakes driven next to the plants. The stems of the plants are tied loosely to the cords with raffia or string. If this plan is used, considerable ground space may be saved. Tomatoes, peas, and pole beans do very well when supported in this way.

Use of wire.—Many running plants may be trained to wire trellises, such as grapes, currants, and other small fruits, cucumbers, and some squashes. We have seen pumpkin vines attached to fences with the fruit suspended. If space is limited, this plan is worth trying. It seems a great waste of land to let vines cover the largest portion of the ground. If possible, the gardener should utilize the space *above* the garden.

Soil support.—Corn, tomatoes, potatoes, and other plants may be supported with soil. Plant in trenches and later draw the soil high against the stems.

NOTE.—Supports should be substantially placed to withstand the wind.

Lesson 20: BEANS.

Beans are a fundamental basic food. They are grown easily by the amateur gardener; hence every garden should produce enough beans to serve the home table.

Best varieties:

Dwarf or Bush Green Podded.
Refugee.
Dwarf or Bush Wax Podded.
Pole or Running Green and Wax Podded.
Kentucky Wonder.
Lima Beans—
Bush—Burpee's Bush.
Henderson's Bush.
Pole—King of the Garden.
Early Leviathan.
Canadian Wonder.
Black Valentine.
Prolific Black Wax.
Golden Wax.
Kentucky Wonder Wax.

Unless the growing season is long and the climatic conditions are cool and somewhat moist, lima beans should be used green-shelled.

Special needs of beans.—Beans require much moisture. They are warm-weather loving plants and are quite sensitive to frost. They have an extensive root system and need plenty of room for root growth.

The seed bed.—The seed bed should be a light open soil, well worked, firm, and well supplied with moisture.

Planting.—Take some risk with late frosts in planting pole beans. Plant tested seeds in four 6-inch hills, 2½ to 3 feet apart, about one inch deep depending on moisture conditions. Place poles in each of four hills in opposite rows and tie them at the top, making an "Indian Tepee." After thinning to two plants in a hill, train them about the poles.

Plant dwarf beans 4 to 6 inches apart, 1 to 2 inches deep, in rows 14 to 18 inches apart, after danger of frost is over.

One-half pound of dwarf varieties will plant a 50-foot row. The same amount of pole varieties will plant 25 hills.

Make several successive plantings, particularly of the dwarf varieties, in order to have a continuous supply for the table.

Later care of the plants.—Irrigate and cultivate often. Keep the pods picked if the beans are used green. Examine the plants early and regularly for plant lice. Destroy by pinching or spray with Black Leaf 40 if they have become too numerous.

Lesson 21: CUCUMBERS.

Varieties.—Arlington White Spine, Long Green, Klondyke.

Needs of cucumbers.—A rich, moist, fine seed bed. For best results, heavy fertilization and considerable irrigation are necessary. Hot, dry weather is offensive; therefore, in localities with hot summer days, it is advisable to force cucumbers in the spring and replant for fall harvest.

Planting.—Plant in the open after all danger of frost is over in hills 4 to 6 feet apart, 6 to 10 seeds in a hill. Space the seeds well in the hills and be sure they are planted deep enough to reach moist soil.

For forcing, plant seeds in fruit boxes in a protected place, several weeks before the danger of frost is over. Prepare the seed beds outside by placing a shovelful of manure a foot or so beneath the surface soil where the plants are to be placed.

Later place the plants, boxes and all, in the soil thus prepared.

Culture.—Cucumbers demand moisture; therefore, irrigate if necessary and cultivate often. Do not allow the soil to bake. Watch the young plants carefully for evidence of insect pests. Do not let them get started. Thin the plants to two or three to a hill. Keep the soil stirred close around the stems.

Harvesting.—Pick the cucumbers when they are about three-quarters size. Do not let them go to seed. Pick the fruit and irrigate to keep the vines producing.

NOTE.—For pickling stock, in warm valley land start seeds in the midsummer. Thus the fruit comes on during the cool autumn days.

Cucumbers may be grown in odd places wherever space admits. The vines may be trained on supports. If ground space is limited, make use of the space above the ground.

Lesson 22: MELONS.

Do not depend on the farmers to grow your melons. They are easily grown by the amateur gardener.

Varieties.

Muskmelon: Acme, Rocky Ford, Fordhook, Cassabas or Winter Muskmelons, Golden Beauty, Winter Pineapple.

Watermelon: Kleckley Sweet, Georgia Rattlesnake, Florida Favorite.

Special needs.—Melons need a rich, moist, sandy loam. They will not do well on heavy soil. To develop rapidly, heat is necessary.

Planting.—Treat as for cucumbers except the hills should be twice as far apart. Pulverized manure worked into the areas to be planted will give excellent returns.

Aftercare.—About the same care should be given melons as for cucumbers. *Watch for plant lice.* We have known growers who stirred the soil with their fingers about the plants to get superior melons. The surface roots are seldom disturbed when this is done carefully. Many gardens fail to produce satisfactorily because important feeding roots are destroyed in cultivation of the plants.

NOTE.—Plant a few seeds in a tub. Give intensive culture. You will be surprised at the results.

Cassabas picked green may be stored in a cool house or in a cellar. They will ripen for use from time to time until far into the winter.

Lesson 23: KOHL-RABI.

Kohl-rabi is a cross between a turnip and a cabbage. It is not so well known, yet it is a superior food and far more easily grown. Try it.

Varieties.—Early White Vienna, Early Purple Vienna.

Planting.—Plant seeds two or three to an inch, one-half inch deep in rows. Space the rows about 18 inches apart. The seed bed should be firm and mellow.

Kohl-rabi is hardy and will stand rather heavy frost; therefore it may be planted as vegetation begins to show activity in the spring or in July for fall gardens.

Later care.—Cultivate, irrigate as necessary with trenches. (Do not cut trenches too close to plants.) Thin the plants early to 3 or 4 inches. Repeat the thinning process a few days later. Finally the plants should stand 6 to 10 inches apart.

Plant lice are a pest of this plant. Examine the leaves often and destroy all the insects discovered.

The food substance is stored above ground in a head which should be removed and used before it toughens with age. Kohl-rabi taste very much like turnips and may be given about the same treatment in preparation for the table.

Lesson 24: ONIONS.

Varieties.—Onion sets are tiny onion bulbs grown from seed and are so formed by sowing 50 to 75 pounds of seed per acre. Plant brown or yellow sets early in the spring. They withstand the frost. White and Bermuda sets may be used best for fall gardens.

From seed plant Red Wethersfield, Yellow Danvers, Prizetaker.

Special needs of the onion.—The onion does best in a seed bed thoroughly pulverized (there must be no clods) enriched with manure. It thrives on an abundance of humus and water, yet the soil must be well drained. Onions, to do their best, must grow steadily. They must receive no setbacks.

Planting.—Plant sets near the surface right side up in rows spaced 2 to 6 inches apart, depending on whether one desires large dry onions or small green ones. Large onions may be obtained at least six weeks earlier with sets than from seed. Arrange to have the rows 12 to 16 inches apart.

Plant the seeds early in the spring, 1 to 1½ inches deep, in rows 12 to 14 inches apart.

Later care.—Cultivate often. Do not let weeds get established. Thin as seems necessary, depending somewhat on the use to be made of the crop. It is not necessary usually if the onions are to be pulled green. See that the ground is moist, for onions thrive under such conditions.

NOTE.—The most important item in growing onions is good seed. Onion seed deteriorates rapidly. See that you obtain new seed. Test it before planting.

The finest onions are grown as follows: Broadcast seed early in a well-prepared bed, say 4 by 5 feet. Scatter over it well pulverized screened manure. Keep the bed moist. Hand

pick the weeds. As soon as the plants are 5 inches high commence to transplant to another area thinning out the propagating bed as this is done. Wait until the remaining onions are the size of a lead pencil and transplant. Cut the roots back to 3 inches before replanting.

It follows that in localities where the growing period is short the seed should be planted first in hotbeds or cold frames.

A seed plat 4 by 5 feet will furnish enough plants for an onion garden 12 by 40 feet, rows spaced 12 inches.

Lesson 25: CELERY.

Varieties.—Columbia, Giant Pascal, Winter Queen, White Globe.

Needs of celery.—Celery is a heavy feeder. A well fertilized (manure), moist, seed bed is necessary. Hot days and nights are offensive to celery. Therefore, in localities of high temperature celery is best planted in the fall and early spring.

Planting and culture.—The seeds are very fine and germinate slowly. Therefore, plant in boxes or in a cold frame. Plant early as the young plants should be two to four months old before transplanting.

Scatter the seeds on a fine, moist seed bed. Press and cover lightly. Cover the box with glass to retain the moisture. Prick out the weeds and small celery plants until they stand about one to each square inch. When they are about 3 inches high cut back to half size. Repeat the process when the plants are up again, say, 4 inches high. Transplant to the open, 6 inches apart in a row a few days later.

Irrigate and cultivate as necessary.

Stir the soil away from the plants until they are a foot high, then gradually work the soil up rather high on the stems when the soil is dry on top.

The best way to blanch the stems is to place 10 or 12 inch boards at an angle of 45°. The boards should be placed in such a way that sunlight and rain will be excluded. However, any method that will exclude light and moisture is satisfactory; newspapers or burlap wound about the stem will do.

Lesson 26: GARDEN PEAS.

Varieties.—There are two main divisions of peas—smooth and wrinkled. The smooth varieties are the more hardy of the two, yet wrinkled peas are the more popular.

Wrinkled type: Yorkshire Hero (late), American Wonder (early), Gradus, Telephone, Little Marvel.

Smooth type: Alaska, First and Best, Melting Sugar.

Needs of peas.—A rich, rather heavy loam; a large amount of moisture. Dry heat reduces the output of peas.

Culture.—Sow the seeds, 1 or 2 inches apart, 2 to 4 inches deep in 3-foot rows. The drier the soil the more deeply the seeds should be planted. Plant early to insure plenty of moisture. Peas are hardy and will resist light frosts. In Californian valleys, peas are often planted in the fall. During the mild winter a strong root system is set. Later the vines produce an early abundant crop of peas.

Do not forget that peas *need water*. Irrigate and cultivate. If the seed bed is moist, work the hoe more and the hose less.

Harvesting.—Pick the peas when they are tender and sweet. Keep the vines clean. The aim of a plant is production of seeds. Deny seeds to the plant, and production will be increased materially, and the plant will continue to send out more fruit.

NOTE.—For a continuous output of peas plant seeds at intervals of two weeks of early and late types.

Lesson 27: CABBAGE.

Varieties.—Early: Jersey Wakefield, Copenhagen. Late: Flat Dutch, Danish Ball Head.

Soil and climate.—Cabbage to mature early requires a rich, warm, mellow soil. The seed of the early varieties may be sown in a hotbed or indoor seed box. The plants are hardy and will stand a light frost. Cabbage can be left in the garden until cool weather without injury to the heads.

Planting and cultivation.—The plants should be transplanted as soon as the soil can be placed in good condition. They should be placed about 12 to 18 inches apart in the row and one-half to 1 inch deep. The rows should be from 30 to 36 inches apart for convenient cultivation with the wheel hoe. Seed for the fall crop should be planted in June. Transplant the plants as soon as they are about 4 inches in height, and the soil contains sufficient moisture to insure their proper growth.

Chinese cabbage.—This plant is closely related to the turnip and may be used either as a potherb or as a salad. It is most frequently used as greens during the spring months because of the difficulty of getting it to head during this season. The growth and cultivation of Chinese cabbage is like that for the common cabbage. It needs a rich, well-drained soil, but also plenty of moisture. For a late crop plant about the same time as you would fall turnips. This plant matures in much less time than ordinary cabbage.

Lesson 28: EGGPLANT.

Varieties.—Improved Purple New York, Black Beauty.

Needs of the eggplant.—The eggplant needs a rich, moist, warm seed bed. It is tender and easily killed by frost. More than many other vegetables, it needs to grow rapidly, with no setbacks.

Planting.—Germinating eggplant seeds need bottom heat, i. e., they should be planted in hotbeds to give best results.

Plant the seeds one-half inch deep in boxes in the hotbed in rows 2 or 3 inches apart. Keep moist. Prick out the weeds. Thin the plants.

As soon as frost danger is over, transplant to the open. The plants should stand 2 to 3 feet apart each way.

Culture.—Keep the plants growing vigorously. Therefore, irrigate and cultivate when necessary. Pinch out terminals so that the plants will not set too much fruit.

Lesson 29: PEPPERS.

Varieties.—Large Bell, Chinese Giant, Pimiento.

Needs of peppers.—Peppers demand a rich sandy loam, well drained, yet moist. They are warmth-loving plants.

Planting.—The seeds should be planted early in hotbeds or cold frames a month or more before moving to the open.

Plant the seeds in boxes one-fourth inch deep, in rows about 3 inches apart. It is advisable to scatter fine sand thinly over the top soil. Keep the soil moist, but not wet.

After the young plants have set four or five leaves, transplant to the open, 12 inches apart in rows spaced about 2 feet apart.

Culture.—Cultivate and irrigate often. Keep the soil stirred close around the plants. Baked soil is offensive to peppers. This stirring may be done with a small stick or the fingers.

Harvesting.—Pick the peppers before they become woody. Dry, use green, or can, as desired. A pepper should not be allowed to remain on the stem more than two weeks. They are best if picked just as they begin to turn red. The more peppers picked, the more blossoms will form.

Lesson 30: PARSLEY.

Parsley is the favorite garnish for American foods. It is also used for flavoring soups and stews and to a less extent in salads.

Such curled varieties as Moss-curled or Dwarf Perfection are most desirable. The fern-leaved sorts are also attractive. Fifteen feet of row will furnish plenty of leaves for family use.

Growing.—Soak the seed overnight in warm water. Sow the seeds in a drill in rich soil, 10 to the inch. Sow radish seeds also, 1 to the inch. Cover half an inch deep. Thin the young plants to 3 inches apart.

Lesson 31: STRAWBERRIES.

Although strawberries are not generally considered a garden vegetable, being termed a fruit, nevertheless they are very common in many home gardens and you should have several strawberry plants in your own garden plat. Strawberries are planted in beds, and it will be necessary for you to set aside a part of your garden for their cultivation, as they form a permanent crop.

Varieties.—

Early: Excelsior, St. Louis, Premier.
Medium: Barrymore, Marshall, New York.
Late: William Belt, Gandy.
Fall-bearing: Progressive, Superb.

Planting.—Strawberries do well in any good garden soil that is fertile and light. Plants are generally set out in the late summer or fall. If good, hardy plants are transplanted to the garden in August, a crop of berries will be ready the next year. Spade up the selected strawberry bed carefully and smooth off the surface with a rake. Set the plants about a foot apart in rows 3 feet apart. Spread the roots of the plants out carefully and firm the soil about them. The bed should be well watered before the plants are set. After the plants are in and the soil has been firmed, scatter a layer of fine soil about each plant. This acts as a mulch and prevents moisture evaporation.

Growing.—Keep a mulch on the bed during the growing season. The bed should be watered every evening until the plants are well started. Pinch off the runners as fast as they get long so that your plants may become hardy. Do not let the bed "mat up" too much.

When fall comes cover the plants with a mulch of old manure and fallen leaves. Renew your beds every two years to keep a fresh growth. Mildew and rust sometimes attack your plants. Spraying with Bordeaux mixture will eradicate these.

Lesson 32: SWEET PEAS.

Varieties.—We recommend separate varieties of Spencer sweet peas to those who desire extra fine flowers. Buy the best seeds of the best varieties. The sweet-pea mixtures are not so satisfactory.

Needs of sweet peas.—No plant responds better to care in feeding, watering, cultivating than the sweet pea. It delights in cool spring weather.

Planting.—Sweet peas are hardy. In the valleys of California they are planted from September to February. Planted early they set a strong root system and later devote all their energies toward fruiting.

Plant the seeds in a row against a fence or a building, 2 or 3 inches deep in a well-prepared seed bed. Plant the seeds an inch apart. For superior flowers dig a deep trench, 2 feet deep. Line the same with manure and cover.

Culture.—As soon as the plants are well set thin them to 6 inches apart. Arrange strings, wire, lattice, or brush upon which the plants may climb. Thin out again, discarding the poorest plants until those that are left stand 10 to 12 inches apart. Assist the tendrils to reach the support. Water freely using the trench system and stir the soil often, close about the stems.

Harvesting.—If the plants have been well cared for, many of the blossoms will have set four to a stem and the stems will be 12 to 18 inches long.

Pick the flowers daily. Do not let them go to seed.

Lesson 33: BULBS.

Varieties.—In our experience hyacinths, daffodils, Spanish iris, and tulips give best results, as they appear in this list. We recommend the double varieties.

Planting.—In the valleys of California and in other places of a similar climatic condition, bulbs are planted both inside and outside in October. Planting time will be delayed in other regions.

Nothing is quite so pretty as a solid bed of blossoming bulbs all of one color or variegated.

In the open, bulbs should be planted in tin cans, pots, etc., at not so great a depth. After planting moisten the soil and place in a cool, shady place.

The bulbs will develop a vigorous root system and later the stem tips will show.

Culture.—As soon as the tips appear bring the bulbs to the light; water and force them along.

Keep the top soil stirred. Do not let it bake.

NOTE.—If the bulbs are grown at home by the children, as soon as flower spikes appear ask the owners to bring the plants to school for a few days so that all may enjoy the blossoms. The bulbs will blossom irregularly. By this method a continuous display of bulbs may be had from the beginning to the end of the season.

Bulbs suspended in fruit jars by string so that the base of the bulbs just touch the water make a nice demonstration.

Because bulbs and sweet peas are such satisfactory plants for children to grow, cultural suggestions are included in this manual.

Lesson 34: MARKETING THE SURPLUS.

TYPES OF MARKETING.

Community types.

(*a*) Children's community market in an attractive central location.

(*b*) Children's space in the municipal market.

(*c*) Children's market at the school.

Individual types.

(*a*) Children's market at home. This plan provides for sale to those who call at the home, as well as that sold to neighbors.

(*b*) By use of parcel post.

Cooperative types.

(*a*) Provision for sale of produce through the U. S. School Garden Army officers at central location in city, at school, or in the municipal market.

THE MARKET.

Preparation.

(*a*) See that all produce is in the best possible marketable state.

(*b*) Uniformity of size in each group or type is essential.

(*c*) All produce should be clean, fresh, and crisp.

(*d*) Produce should be graded according to quality as well as size.

Display of vegetables.

(*a*) Make the market display attractive.

(*b*) Use uniform and inexpensive containers.

(*c*) See that all produce is free from defects.

(*d*) Arrange the display according to types.

Some examples of vegetable types.

(*a*) Root type: Carrots and turnips.

(*b*) Head type: Cabbage and head lettuce.

(*c*) Stem type: Celery and potatoes (underground).

(*d*) Leaf type: Leaf lettuce and spinach.

Lesson 35: BIRDS AND THE GARDEN.

Bird authorities of Massachusetts estimate one day's work by the birds in that State to be the destruction of 21,000 bushels of insects. In Nebraska it is estimated that 170 carloads are destroyed each day. While thousands of insects are destroyed through other natural agencies, think for a moment of the number of insects all the birds of the whole United States must destroy in one day and in one year.

There are other reasons for protecting the birds. While a few birds are unprotected by law because of their harmful ways, the great majority do more good than harm.

There are times when the gardener's patience is tried severely by the birds. Many of them visit the gardens, some to eat the insects, others to pick the plants. Do not destroy the birds. Protect the garden from their visits.

Cover with cheesecloth frame.—Make light frames 2 to 3 feet wide and 12 feet long. Cover with cheesecloth. Wire netting serves the same purpose. Put the frames on short legs. Move the frames about as desired. Cover the plants which the birds attack most. Grow in cold frames the plants which birds seek.

Cover with brush.—Young plants may be protected by scattering small brush over them. Avoid shutting away too much light.

Use scarecrows.—Scarecrows are not very effective. Birds soon get acquainted with the quiet visitor.

Use shiny objects.—Stick pliable poles obliquely in the ground. To these attach bright tin cans, pie plates, or pieces of looking glass with string. As the wind blows, shafts of light shoot here and there.

Use paper bags.—Paper bags containing a handful of peas and blown full of air suspended to stakes are of some assistance. The bags blow and the peas rattle.

Use a rag line.—Stretch a strong string or wire between poles placed at each end of a row. At regular intervals, as close as seems necessary, attach white cloth streamers or strips of tin. These will swing in the breeze and frighten the birds away. The streamers should swing rather close to the plants.

Lesson 36: HARVESTING.

Foodstuffs, particularly vegetables, are best for human consumption at certain periods in their growth. Considerable waste may be prevented if one knows the best time to harvest vegetables.

Root crops.—Root crops deteriorate very rapidly with age. Radishes become pithy and strong. Carrots, turnips, and beets toughen soon after maturity. Therefore, such crops should be pulled when young. Young carrots make excellent soup. Root crops often mature irregularly. Pull the largest vegetables first.

Leaf crops.—Lettuce, spinach, endive, and chard should be harvested when the leaves are young and tender. Pick them in the morning when they are filled with moisture.

The outside leaves of chard may be cut away lightly as soon as they are a foot high.

The leaves of leaf lettuce should be pulled when the plants are young. Head lettuce will toughen if allowed to age. In this case the outside leaves are wasted.

Cabbage and cauliflower should be harvested regularly when young. They toughen after passing three-quarter size.

Kohl-rabi, a delicious vegetable when young, deteriorates rapidly with age. The outside skin will toughen soon after the plant reaches half or three-quarters size.

Vine crops.—Two or three days in the age of beans affect their food value materially. String beans should be harvested when they snap readily and have soft, pliable tips. So much attention is not necessary in harvesting shell beans. They must be left on the vines until the pods fill, but not until they dry out, as production will be limited.

Lima beans should be picked before the slightest hint of yellow is seen. After that time they have passed their prime as green beans.

Tomatoes should be picked as fast as they ripen. If frost threatens in the fall, pick all the green tomatoes, roll each in a piece of paper and store in a dry place. These may be brought to the light, a few at a time, later. They will ripen and may be used on the table.

Peas toughen very soon after reaching maturity and should be picked when young.

Melons are ready when they crack around the stem. A peculiar mellow response to the thump of the thumb is characteristic of the ripe melon.

Summer squash should be picked before the shell hardens. Hubbard squash may be left until the other harvesting is done. There is no hurry about picking pumpkins, although they should be harvested before they are frosted.

Cucumbers lose their attractiveness as a food soon after maturity. They should be picked as fast as they reach three-quarter size.

Stem crops.—Asparagus should be cut close to the ground as fast as the stems reach 12 inches in height and the size of a finger.

Rhubarb is at its best when harvested young. Cut the stems close to the ground but do not disturb the crown. Do not let the plants grow to seed. Cut back the seed stalk as fast as it starts to develop.

Irish potatoes are ready when the tops die.

Corn.—Gather the corn fresh for the table when it is in the "milk." Corn loses its sugar content very rapidly after picking.

General rules for harvesting.—(1) The aim of a plant is reproduction. After fruit has ripened, production stops. Therefore, production is increased if no fruit is allowed to ripen. During the harvest time, remove the fruit before maturity and water the plants freely. This method will increase the output considerably. Generally speaking, pick fruit when it is three-quarter size or earlier.

(2) Pumpkins, squash, and melons should be picked leaving a portion of the stem if they are to be kept any time. Removing the stem close to the fruit wounds it and decay sets in.

(3) Pick vegetables in the morning, which are to be used during the day. Rinse them in cold water. Place them in a cool place.

(4) Turnip tops to be used for greens should be cut before the roots show much increase in size. Tops of other plants used for the same purpose should be cut when the plants are young.

Lesson 37: USE OF THE GARDEN PRODUCTS.

The primary end of the school-directed home garden is to produce *food for the home*. Children should be urged to grow garden foods for this purpose.

Supply the table.—The first end of the garden is to supply the table with crisp, juicy vegetables and small fruits. The average home gardener will plan to produce what the family will use. It is not so much what one grows as what is used.

The surplus.—The surplus should be canned, dried, or stored.

The market.—The end of the average home garden should not be commercial in nature. Yet, to prevent wastage due to a sudden onrush of products or lack of canning and drying material, the surplus should be sold. Encourage the children to practice thrift. Discourage careless use of money.

Give to the poor.—One school garden in a California city supplied 13 poor families throughout one season. Suggest this use of the garden output to the children.

Feed domestic animals.—A fair-sized garden may be made to help feed the chickens and rabbits. Nothing suits baby chicks better than onion tops chopped fine. Tops from other vegetables serve the same purpose. Deformed carrots and other root crops may be fed to rabbits advantageously.

The compost pile.—Vines of all kinds, tops not serving other purposes, garden refuse of all kinds, should become a part of the compost heap.

The garden luncheon.—Encourage the children to give a luncheon serving products from their gardens.

Lesson 38: SAVING SEED FROM THE GARDEN.

The home should be made as self-sustaining as possible; therefore, it should grow its garden seeds when practicable. In planning the garden this matter should receive consideration. The seed garden should be a part of the year's plan. At any rate, a few of the plants in the main garden should be allowed to go to seed to serve for the following year.

Vegetables are divided into three groups: (1) Annuals, (2) biennials, (3) perennials.

Annuals.—The annuals live for one year and ripen their seeds. The chief annuals whose seeds should be saved are: Peas, beans, spinach, corn, squash, pumpkins, melons, cucumbers, tomatoes, lettuce and radishes.

Biennials.—The biennials ripen their seeds the second year and then die. Save seeds from carrots, beets, cabbages, onions, parsnips, and turnips. It follows that biennials must be allowed to stay in the seed garden two years. However, roots or plants that have been stored may be planted to produce seed the same year.

Perennials.—The tops of perennials usually die in winter but the roots or rootstocks live on year after year. While some of the perennials may be grown from seeds it is far better to propagate from "piece" roots. These may be purchased. Time is gained and the plants come true to variety.

Some of the perennials are: Rhubarb, asparagus, and horse-radish.

How to harvest the seeds.—When the seeds are ripe, gather them from the plants that show the most vigor and that are nearest to type before danger of frost and spread them out to dry in a sheltered place.

Pumpkins, cucumbers, melons, tomatoes, and the like should be opened before there is danger from frost. The seeds should be removed and the fleshy matter washed free. The seeds should be dried in a sheltered place. Seed such as lettuce, radish, and beets may be whipped out on a piece of cloth or paper, or rolled out in the hand.

Care of seeds.—The children should make small envelopes. These should be labeled and filled with the seeds which have been cleaned and selected as to size, color, and nearness to type.

Seeds passed from one receptacle to another on a windy day will be cleaned from chaff.

Weak, deformed seeds, all seeds not true to type should be picked out and discarded.

File the envelopes in a dry place protected from mice.

Lesson 39: LITTLE THINGS IN FOOD CONSERVATION.

The accumulative effect of little things is often underestimated. The average home gives attention to canning, drying, and storage of foodstuffs, but little things in handling foodstuffs are often neglected. Food is so necessary all waste should be eliminated.

The refrigerator or cooler.—Too many wilted, dried up vegetables go into the garbage can every day. Particularly is this true of the home which is not supplied by its garden. If more vegetables are picked or purchased than are used by the family during the day, they should be kept in a cool moist place. The tops of the root vegetables should be left on the plants.

Chickens and rabbits.—The waste and refuse from the average garden will help materially to feed a few chickens and rabbits. Deformed vegetables, the tops of carrots and beets, the discarded leaves of lettuce and cabbages, are relished by chickens and rabbits.

Timely harvesting.—Vegetables often are allowed to age to such an extent that they can not be used on the table. This is poor garden management. Not only are such foods wasted, but such plants as peas, cucumbers, and beans stop bearing.

Waste from frost.—The garden season is not only shortened by frost, but thousands of dollars in garden products are lost each year. Lengthen the growing season and save frost wastage in the garden.

Kitchen planning.—Onion tops, beet tops, otherwise wasted, may become a part of salads, soups, and greens. Watermelon rinds may be saved for preserves. In fact, the careful housewife can prevent wastage by using parts of vegetables, otherwise wasted, in soups, greens, salads, and preserves.

Lesson 40: THE FALL GARDEN.

To sustain energy and strength, one must eat regularly simple, substantial food. Foodstuffs must reach the table in a continuous flow. In some planting zones the growing season is so short the soil does well to produce one crop of food. However, there are thosands of acres of land which lie idle and are only half efficient, although nature lends herself to growth throughout the year. Food is so necessary in these days of work and worry, every square foot of soil should be made to produce the maximum amount.

It is not generally known that in regions where frosts come late in the fall, as in California, in parts of Oregon and Washington, and in other localities of a similar climatic nature, early July is a second spring. With water, one may plant at this time sweet corn, tomatoes, late squash, and other warm weather loving plants, also radish, lettuce, spinach, carrots, beets, onions, cabbage, practically the whole list of vegetables.

The trick in fall gardening is to insure a moist seed bed. The soil should be moist to a depth of 2 feet. Where summer or early fall rains are common, irrigation may not be necessary.

If irrigation is practiced, corrugate the garden plat with trenches. Fill these trenches several times with water. Possibly a better way is to shape the area into several basins by raising small levees with a hoe. Fill the basins several times with water. This practically floods the plat. Some gardeners keep sprinklers running. This is the easiest but not always the best way. Any method which gets the water deep into the soil is suitable.

Spade and work the soil as soon as possible after irrigating. Lay off the garden according to your plan and plant your seeds To prevent the top soil from drying out and baking, scatter a thin layer of pulverized manure over the garden, such as may be obtained in a stock corral. Some gardeners use sacking or paper to accomplish the same purpose. If this method is used the cover must be removed as soon as the tiny plants appear beneath it. We advise the first plan. Due to hot weather it may be necessary to start the seeds by sprinkling every evening, since the top soil may dry out somewhat. The manure will prevent baking and loss of water. As soon as the plants are well started, little irrigation will be needed if the soil were properly moistened.

Cultivate and treat the plants as usual.

Garden areas otherwise idle will serve the table with crisp, juicy vegetables at a time when such foodstuffs are scarce and high.

Try the fall garden. It promises more success for the amateur than the spring garden. There is less with which to contend. There are fewer insect pests and fungous diseases.

Do not plant seeds in soil and depend on sprinkling. You will be disappointed. The seed bed must be moist below.

Lesson 41: FALL PREPARATION OF THE SPRING GARDEN.

In these days of work and worry one should plan to make the garden produce abundantly at the least expenditure of time and energy.

Amateurs have learned a great deal from war garden experience during 1917 and 1918, yet there is more to be learned in order that backyard areas may be made fully productive.

More attention must be given to the preparation of the seed bed. Seeds must be more carefully selected as to the variety and vigor. Fewer insects must be fed. The fall is not too soon to begin the preparation for the spring garden.

Clean up the trash.—Few people recognize the maggot so common in the manure pile as a stage in the life history of the house fly. Information regarding the cabbage butterfly is confined largely to the adult. The average amateur gardener is not conversant with the life history of harmful insects. Insects which swarm forth in search of food in the spring have spent the winter in many instances in eggs—the larval or pupa stages, all of which are protected by weeds, garden refuse, and other trash.

All material of such a nature which can not be spaded under 6 to 8 inches deep should be raked into a pile and burned.

Fertilization.—Scatter fresh manure freely over the garden plat. When a winter "cover" crop is practicable, seed of vetch, burr clover, and the like may be sown early in the fall. With rainfall or irrigation the plants may be given a good start before winter sets in.

Spading.—Give the plat a deep thorough spading or plowing. Vegetable and animal matter will be turned under. Leave the ground rough. Thus rain and air will penetrate deeply into the seed bed. Due to weathering, physical and chemical changes will take place, plant food will be elaborated, and the soil will be in excellent physical condition for spring treatment.

If a "cover" crop is planned the seed should be planted soon after spading or plowing.

It is often advisable to scatter over the top a thin layer of fresh manure after the spading is done.

Tools and other garden aids.—During the fall and winter, repair the tools, build a cold frame and a hot bed. Make frames for drying vegetables. Prepare home-made apparatus for canning and storing garden products. In fact, get ready to make the garden a prominent factor in home-keeping.

Lesson 42: A COMPOST PILE.

Decaying and decayed vegetable and animal matter is a mine of plant food. Plants must have humus, yet the average gardener fails to conserve the humus-forming material about the home.

How to make a compost bed.—Dig a pit 4 by 6 feet, 2 to 4 feet deep. As the leaves fall, rake them into piles and throw them into the pit. Scatter a thin layer of manure over the leaves. Add a thin layer of garden soil. Gradually fill the pit with leaves, paper, lawn cuttings, weeds, manure as they accumulate. As this is done, scatter in thin layers of soil. During the season the pile should be kept moist and turned at least three times.

Another method in common practice is to make the pile on the surface. Layer after layer of garden soil, manure, weeds, straw, and leaves are added to the heap until it is several feet high. This is moistened and turned as needed.

Value of compost pile.—Fermentation will take place, the mass will decay slowly. Weed seeds, insects, and their eggs will be destroyed. The mass will furnish the gardener with warm, rich soil for pots, flats, and the garden. Humus, the most valuable of plant foods, will be conserved.

Compost started in the fall will be ready in the spring.

Lesson 43: THE COLD FRAME.

A gardener, to work most efficiently must have his equipment—wheel and hand tools, cold frame and hot bed.

Where the climate is mild the cold frame may take the place of the hotbed in propagating many plants which are to be transplanted. However, the cold frame is used much for hardening off plants which are forced in a hotbed or greenhouse. Such plants are moved to the cold-frame and then to the open.

Installation.—The frame for a hotbed as suggested in Lesson 44 will do for a cold frame. Heavy muslin or burlap will take the place of the sash in mild climates. Tack the muslin to a pole. Place it on the frame. Roll and unroll the protective covering as weather conditions demand. The size of the frame may vary with the needs of the gardener.

Use of the cold frame.—Flower and vegetable seeds may be sown much sooner in cold frames than outside. Thus tomatoes, cabbages, cauliflower, onions, etc., may be given an early start.

Leaf vegetables such as lettuce are improved if matured in a cold frame. They may be protected from frost, from too much heat, and from birds.

If handles are attached to the frame, it may be moved readily and placed over tender plants if frost threatens or birds are destructive.

Lesson 44: A HOTBED.

For maximum growth the average plant needs food, air, warmth, light, and moisture in abundance. However, temperature is the limiting factor very largely in a plant's development. Temperature may be controlled in hotbeds and greenhouses very satisfactorily. The greenhouse is impracticable for the average home, while a hotbed may be installed at little expense by the amateur.

Installation.—In some convenient, well-drained place dig a pit 2 feet deep and a little less than 6 feet square. Fill the pit with manure, prepared as follows: First, make a pile of fresh horse manure. Be sure the pile is moist. Second, after fermentation has begun, turn the pile. Third, keep turning the manure until the fermentation process seems uniform. Pack the manure in the pit thoroughly. Cover with 4 to 6 inches of fertile soil.

Place over the pit a frame made to take nicely two sash 3 by 6 feet. Construct the frame 16 inches high at one end and 12 inches at the other, so that the slope will face the south. Swing the sash on hinges, so that they may be raised or lowered at will. With stakes driven in the ground, fix the frame in place. Bank it thoroughly with dirt or manure.

Care of the hotbed.—Raise the top several inches. After a few days excessive fermentation will stop, uniform heat will be given off, and the hotbed will be ready for use. The temperature should be about 85° Fahrenheight.

It is very essential to ventilate hotbeds carefully and to keep the temperature uniform. Plants are affected very considerably by environmental changes. Fresh air must be admitted each day. Be careful not to chill the plants.

When it is needed, water the plants carefully in the morning. Keep the plants on the "dry side," as excessive moisture and warmth favor fungous diseases.

How to use the hotbed.—Hotbeds have two general uses: (1) To propagate plants which are to be transplanted later; (2) to mature plants, such as lettuce out of season.

The hotbed should be built in the fall, so that it will be ready for use to force plants in time for seasonal transplanting. Onions, tomatoes, cabbage, cauliflower, eggplant, lettuce, etc., should be sown in flats, pots, or directly in the soil in time to reach the open at the proper period. This is governed by temperature largely and is a matter of local information.

If perchance the seed is sown too early, the young plants may be kept sturdy by shifting from one flat to another, by transplanting within the hotbed.

NOTE.—The size of the hotbed may vary with the size of the garden and the desire of the gardener. The bed may be built to use window frames of convenient size, which may be of no other use to the home.

Lesson 45: FROST PROTECTION.

With some thought and care the garden may be kept producing after the first light frosts of the fall. It follows that the same attention will save plants from the late spring frosts. Protective devices will materially lengthen the garden season.

During the period of danger, weather forecasts should be followed closely and frost warnings noted. Usually the observant gardener learns to interpret signs of coming frost. For instance, in the Sacramento Valley, Calif., frost is usually preceded by a rain and a hard north wind, which is followed by a calm. The gardener should familiarize himself with local signs of approaching frost.

There are reliable instruments which forecast frosts. The "Frost alarm" is a mechanical device costing about $25. A thermometer is so arranged that it rings a bell when the temperature drops to a certain point. This point varies with the wishes of the purchaser. A hygrometer may be purchased or homemade. Take two thermometers. Over the end of one place a short round wick. Place the end of the wick in water. Suspend both thermometers close together, one dry, one wet. By noting readings each evening and consulting a table prepared for such a purpose, and which may be obtained easily from weather bureaus, and some books on agriculture, frost may be forecast.

Use of small fires.—Thousands of dollars have been saved by growers through the use of "smudge" pots. A gardener can easily protect his crop from light frosts if he desires. Scatter large sized crisco cans or other cans that will hold a gallon or more about the garden. Inclose the garden with cans placed about 6 feet apart. Put a can near each tomato plant or others of like nature, if they are 4 feet apart. Fill the cans with a light crude oil, which will cost about 5 cents a gallon. Keep the cans covered. When the thermometer reaches the danger point,

throw a tablespoonful of gasoline on the oil in a can and light immediately with a torch. Proceed as needed to keep the temperature from dropping. Place the thermometer in the coldest place in the garden. The oil will burn from 3 to 5 hours.

Use of protective covering.—Cheesecloth, muslin, sacking, and newspapers thrown over the plants, such as tomatoes, strawberries, and the like, will prevent frost damage. For small plants, muslin is often stretched over light frames, which are used one to a plant. Larger frames may be used to cover several plants at a time.

Small potato plants may be protected by covering them with dirt. They should be uncovered within three or four days, or earlier, if weather conditions permit.

Cold frames and hotbeds.—The main purpose of cold frames and hotbeds is to grow plants out of season. It follows that such garden aids protect plants from frost.

Tin cans, fruit cartons, and the like.—Tin cans and fruit cartons inverted over small plants at night will safeguard them from frost.

Use of water.—The gardener often rises in the morning to find that Jack Frost has been at work. Experience seems to teach that if the frosted plants are sprinkled freely before the sun rises they may be saved from absolute loss.

It is claimed that if the garden is irrigated while the temperature is at the danger point the plants will not freeze.

Lesson 46: JUDGING THE HOME GARDENS.

The fairest way to judge a garden is to visit it while it is in operation. The judges can then see the conditions involved in making it successful, and can estimate pretty fairly the various points to be considered. Such an estimate is difficult at best, and the following score card is offered simply as a suggestive guide, which any set of judges may modify to suit themselves. Any such modifications should, of course, be agreed upon in advance.

SCORE CARD FOR JUDGING HOME GARDENS.

A. General appearance		20	
Arrangement of rows	5		
Freedom from weeds	5		
Cultivation and care	5		
Proper thinning	5		
B. Choice of vegetables		15	
For home use	5		
For marketing	5		
For canning	5		
C. Freedom from pests		15	
Spraying for insects	5		
Spraying for disease	5		
Other remedial measures	5		
D. Evidences of			15
Continuous cultivation		5	
Companion cropping		5	
Succession cropping		5	
E. Care of tools			10
F. Value of produce			15
Used at home		5	
Sold in the market		5	
Used for canning		5	
G. Accuracy of garden records			10
Total			100

Lesson 47: GARDEN RECORDS.

Every gardener should keep an exact record of his expenditures and receipts. The following samples of accounts may be used by the teacher for this purpose. Small blank books may be obtained and the children directed how to rule them off into the various accounts needed.

PLANTING AND HARVESTING.

Date of planting.	Names of vegetables, flowers, and fruits.	Date of harvesting.

WORK DONE.

Date.	Number of hours.	Kind of work.	Cost.	

COST OF GARDEN.

Date.	For fertilizer, seeds, tools, etc.	Cost.	

Lesson 48: VEGETABLES USED AT HOME AND SOLD.

This record should be kept to conform to the standard measures of your local market. The teacher should get local market quotations every few days and help the children enter true value on this form. Children should be taught to read market reports and keep themselves informed as to values.

CROPS PRODUCED.

Date.	Baskets.	Names of vegetables, flowers, and fruits.	Value.	

CANNED PRODUCTS USED AT HOME.

Date.	Number.		Names of vegetables or fruits canned, preserved, or pickled.	Value.	
	Quarts.	Pints.			

CROPS SOLD.

Date.	Quantity.	Names of vegetables, flowers, and fruits.	Cash received.	

TOTAL RECORD FOR GARDEN YEAR.

COST OF PRODUCTION.				MONEY VALUE OF PRODUCTS.			
1. Your own work, ... hours, at 8 cents				1. Value of products used at home			
2. Horse labor, ... hours, at 15 cents				2. Value of products sold			
3. Cost of seeds and plants				3. Value of canned products for home use (look up market price)			
4. Cost of manure and fertilizer				4. Value of canned goods sold			
5. Cost of cans, jars, and labels used in canning				Total			
6. Other expenses				Expenses deducted			
Total				Net income			

PART II. SUGGESTIONS TO TEACHERS.

THE LARGE SCOPE OF THE SCHOOL-SUPERVISED GARDEN.

The garden is a miniature world. In the garden practically all of nature's forces are at work. Here the children may obtain fundamental background experiences with plants and animals, which experiences are necessary to afford a foundation upon which to build the superstructure of literature, art, biology. Children must needs get this background, for life is a continual reaction with nature and her forces and the interpretation of the same. The school must not concern itself alone with tools and agencies for interpretation, arithmetic, geography, history, and the like, but must build carefully the background of experiences. The definite typical, clear-cut experiences obtained in the gardens offer exercise to the agencies, arithmetic, drawing, painting, and oral and written speech.

The garden should become a unifying center for the study of plants and animals. In the preparation of the seed bed, earthworms are encountered. Study them. As the plants mature, insect pests are met. Study them. Now is the ideal time. The children have a vital interest in the cabbage butterfly, since it is a question of its destruction or the loss of their cabbages. Every garden hour brings a surprise.

It is a short step from the garden pest to the problem of the community, of the State, in controlling insect pests.

SCHOOL GARDENS.

The school garden has a value in the school system peculiar to itself. Present conditions, however, do not admit of its general introduction. Many school gardens are started only to be abandoned during vacation time. As yet no adequate form of organization has been made, generally speaking, to take care of school gardens throughout the year. It is bad educational policy for the school to abandon any project which it attempts. A school garden takes far more school attention than home gardens and does not give so great educational and economic returns.

A well-organized school garden program blends nicely with home gardens. It stimulates and strengthens the home garden. There are three types of school gardens: (1) The garden which is used primarily for demonstration purposes. In it the teacher may demonstrate how to prepare a seed bed; how to plant seeds, etc. Such a plat gives the child a type of home garden to follow, for when finished it should be a demonstration of what a typical home garden ought to be. Every school that undertakes home gardens should have such a plat. (2) The community garden in which the children work regularly during school hours. The community garden may include the whole school yard, its beautification, as well as a definite section set aside for growing vegetables and flowers. (3) The garden in which each child has a plat. This type of garden often develops to serve boys and girls who have no garden space at home. The term "school garden" is usually applied to types (2) and (3) or a combination of the two.

The following are some of the advantages of the school garden when properly conducted:

(1) The children are given class instruction. They learn how to grow plants successfully under the guidance of the teacher. Interest follows success. They learn at school what a successful garden ought to be. This class instruction, which is educational economy, is impossible in home gardens.

(2) The boys and girls enjoy the companionship of each other. Interest and enthusiasm are catching.

(3) Social values are secured. The cooperative use of tools, land, water, seeds, teaches children to recognize the rights of others. It emphasizes the fact that the world does not begin and end with them.

(4) School days are often monotonous days. Outdoor work in the school garden relieves the monotony and prevents school fatigue.

(5) The growing child needs exercise, outside air, and play. These are obtained in the garden. Gardening is a form of play with a definite economic and educational trend.

(6) The school garden is a miniature world. All of nature's forces are at work. Insects, birds, earthworms, moles, gophers are busy working out their life histroy. Heat, light, and other forces are taking expression. The school garden is continually offering experiences to vitalize the other subjects in the curriculum. Arithmetic, geography, arts, sciences, and the like may be given new direction. It may become a unifying center for the science work.

(7) An interest in plants and animals developed or fostered at school is invariably carried into the homes. Experience with school gardens shows that from 65 to 75 per cent of the children who have gardens at school have successful gardens at home. Not only are the children interested, they learn at school how to grow plants successfully at home.

This is a strong argument for the properly conducted school garden.

Thus the school garden may become a laboratory, a demonstration place for the home garden.

THE HOME GARDEN.

The home garden is a family affair. It is one part of home making. The average boy or girl feels that he or she is to assume home responsibilities only after reaching manhood and womanhood. Children should be taught as early as three years at least to become a real part of the home by assuming little home duties. Food production may be made a part of the child's responsibility to the home.

The home should be self-sustaining largely.—The home so situated that it can grow a large part of its foodstuffs is fortunate. A plat 10 by 30 feet intensively cropped will go far to serve a family of four, and can be worked by a boy or girl of grammar-school age.

The garden will develop a child's interest in his home.—The child, urged on by the teacher and the parent, will become interested in *his* garden largely because it is his. It follows that a permanent home interest will develop. Recreation will be found at home. Spare time will be spent at home in the garden rather in town on the streets.

Child gardening makes for the adult's recreation.—Nothing is so pitiful as the adult who can not entertain himself. Many adults who find satisfaction and pleasure in gardening may thank some one who interested them in gardening when they were children.

The home gardener is thrown on his own resources.—Parents and teachers are prone to assist children too much. In the garden the child is thrown on his own resources very largely. His success depends materially on his own efforts. He earns what he receives. This is not always true in the school garden. Many children return to their school gardens in the fall to reap the harvest of vegetables which the janitor or some other adult has cared for during the vacation time.

The home unit becomes more complete through the child's home garden.—There are three types of the child's home garden: (1) The one ruled over by the child; (2) a plat which is a part of the family garden and cultivated by the child; (3) the partnership garden where all members of the family work together. Any type insures close companionship of parents and children.

Instruction.—The teacher should visit the home garden regularly for the purpose of giving instruction. She must develop the *will* and help the child find the *way*. The teacher should study plant growth and have her own garden, if she is to become a home garden visitor. Every block contains resident possibilities for garden information.

Teachers become familiar with home life of children.—A teacher is fully efficient only as she understands the home life of her boys and girls. Home and school should have a dual relation. Through the home visit to the garden, home and school come into sympathetic relationship.

Children taught service-patriotism.—During the war the President called to the children to grow food. They responded millions strong. As never before the boys and girls realized that they were serving their country. Thus through home gardens a large unproductive area is made productive by the labor of boys and girls who heretofore could not be classified as producers. In the process of reclamation, land, boys, and girls are benefited.

SUSTAINING INTEREST.

To sustain interest is as important as to stimulate it, and more difficult. To enthuse the child to begin a garden, then allow him to neglect it, is bad educationally and dangerous in the building of citizenship.

DURING THE VACATION MONTHS.

1. *Grant commissions.*—Set aside a special day on which the juvenile gardeners are given their commissions as officers. Make this a big factor by having printed commissions presented at a public gathering by an officer of the Regular Army. Give the officers responsibility under guidance.

2. *Vacation meetings.*—Call the boys and girls and teachers together who are active during the summer at the schoolhouse or at a moving picture theater. Prepare an attractive program consisting of four-minute talks, lantern slides, moving pictures, and refreshments when possible.

3. *Home visitation.*—Arrange to have the home gardens visited regularly throughout the season.

4. *Exhibits and fairs.*—As the different crops mature, exhibit same in some prominent place—halls of schoolhouses, local, county, or State fairs.

5. *Garden markets for surplus.*—See general leaflet on this topic.

6. *Group visits.*—Garden directors should arrange to take groups of children from garden to garden.

7. *The garden luncheon.*—When garden products are in abundance call the children together at garden luncheons. The children should prepare the foodstuffs, menu cards, invitations, decorations, etc. Work should be done on menu cards, invitations, and the like before the schools close, in connection with the art department, etc.

8. *Use of local newspapers.*—Ask editors of local newspapers to set aside space for pictures and articles written by the boys and girls. Appoint school editors.

9. *Excursions and picnics.*—Plan garden excursions, picnics; make it a privilege to be a member of the school garden army.

10. *Insignia.*—Use the insignia of the U. S. S. G. Army. Be sure every child who receives insignia is making a garden.

11. *Affiliation.*—Affiliate with State or Federal organizations.

WHEN SCHOOL IS IN SESSION.

1. *Four-minute talks.*—Arrange for four-minute talks to be given by delegations of children in different rooms of the schools.

2. *Prize banners.*—Use of attractive banners to rotate in the different rooms of the school according to the number of gardens and the conditions of the same in each room.

3. *100 per cent banner.*—Prepare attractive 100 per cent banners for rooms and schools enlisting a full numder of home gardens. This is an excellent project for domestic art girls.

4. *School garden paper.*—Arrange to have a school garden paper, to contain pictures of boys and girls at work in their gardens, and articles written by them.

5. *Posters.*—In the art department, prepare attractive posters illustrating the garden movement.

6. *Correlation.*—Correlate other school work with gardening. Arithmetic, art, composition, science, etc., may be given new directions and vitalized through the school and home gardens. Experiences arising from such work may be made a background upon which other school work may be built.

HOME GARDEN CATECHISM.

1. *What is the aim of the home garden movement?* First, it is a movement to increase the food supply by utilizing the spare time of boys and girls as home makers to grow food stuffs at home. Second, since production is a fundamental principle in education, large educational values—mental, moral, and physical—will be absorbed in the process.

2. *How are the products to be used?* First and foremost to make the homes partially self-sustaining, to grow enough food at home to serve the table with a large portion of its vegetables.

3. *What shall be done with the surplus?* Can and dry what the home will use. Sell the surplus to neighbors or at the grocery stores.

4. *What is the United States school garden army?* It is an organization of boys and girls who are utilizing their spare time in the production of food under the direction of the schools.

5. *What are the boys' and girls' agricultural clubs?* They are clubs organized by the agricultural departments of the several State universities.

6. *Are the United States School Garden Army and the agricultural clubs competing organizations?* No, the United States School Garden Army limits its activities to villages, towns, and cities. The agricultural clubs are formed among boys and girls in the country.

7. *Is the United States School Garden Army a movement to grow food at school or at home?* At home. At first glance the movement seems wrongly named. Strictly speaking this is a school-directed home garden movement. The school garden is encouraged as a place where home processes may be demonstrated with greatest educational economy.

8. *What is to be done to carry gardens through to harvest time?* There are many ways to sustain the interest; pageants, prizes, 100 per cent banners for schoolrooms, schools, and communities, luncheons, meetings, school markets, *home visitation.*

9. *What is the most important way to sustain interest?* Home visitation. Every child's garden should be visited at least once a month, *especially during vacation time.*

10. *What is the test of a school-directed home garden organization?* Home visitation during *vacation time.*

11. *Is it right educational policy for the school to lend itself to a project which it does not see through to completion?* No, if school or home gardens are started, they should be given the attention necessary to insure production.

12. *Who should take care of the vacant lots and larger areas?* Generally speaking, the director of the adult gardens appointed by the board of trustees. The vacant lot project should not be attempted by boys and girls. It is a project for the city officials. Such lots should be plowed in the fall and sowed to winter growing crops. As a special project for boys and girls who have no garden space at home or who desire more land, or for adults who wish larger areas, there can be no objection.

13. *Of what benefit other than increase in food is the home garden movement?*

1. Father, mother, sons, and daughters work on a common home project, thus encouraging comradeship at home.
2. It develops a form of productive play.
3. It utilizes the idle time of boys and girls.
4. Health and recreation are found in outdoor activities such as gardening.

5. It develops a girlhood interest to-day which may become the woman's recreation to-morrow.
6. It brings country values to the city.
7. He who produces is a patriot—a good citizen.
8. Farmers of to-morrow may be recruited to-day from the towns and cities. Through gardening the first principle in agriculture may be taught.
9. Food production gives vitality—new direction to other subjects in the curriculum.
10. Work in the school demonstration plat prevents schoolroom fatigue.
11. Is there a better place for the boy or girl than in the home garden?
12. It makes the home more self-sustaining. Establishes a large educational background—familiarity with nature's activities.

14. *How are companies formed and insignia distributed?* The United States School Garden Army organization involves the formation of companies with officers, a captain and two lieutenants, and a teacher director to each company. The number of soldiers in a company may range from 10 to 150, depending on the size of a school and the wishes of those concerned.

The officers should be appointed largely on qualities for leadership and garden merit. Attractive insignia for privates and officers are furnished free. Posters are furnished free to companies.

15. *How are children to be instructed in gardening?*

1. Through regular class work in the school room and the school demonstration plat.
2. By leaflets and bulletins furnished free.
3. By moving pictures.
4. By the garden inspector—teacher, neighbor, best gardener in the block.
5. By parents.

16. *How may garden directors be financed?* By the school board, the board of trustees, parental clubs, civic organizations, private subscription. However, the school-directed home garden is the business of the board of education.

17. *Is home visitation of the gardens possible?* Yes. Ideally the teachers during the regular school weeks and during the period of the continuation school (vacation time) should visit the home gardens. Each school should become the center of the school-directed home gardens in its vicinity. Each block should become the unit. In every block there are resident possibilities for leadership and garden information. The garden director for the city, through his organization, should search out and use such possibilities. In every block there is some one who will help—a mother, a father, a gardener, a bachelor, or a maid.

18. *But teachers are not trained in gardening; how can they attempt this project?* Teachers are better trained than is universally known. Normal schools and other educational institutions have been training teachers in food production for several years. Many teachers have been recruited from the farms. Teachers and laymen alike rise to meet any demands made upon them.

19. *When are insignia to be presented to the boys and girls?* Only after the gardens have been accepted by the garden directors or visitors. Insignia should be taken from any "slacker." Only deserving gardeners should be allowed to wear the insignia.

20. *How may leaflets, insignia, posters, etc., be obtained?* Address, United States School Garden Army, Bureau of Education, Washington, D. C.

21. *How many children should be enlisted in each community?* All of the boys and girls in the upper grades of the grammar school.

22. *What is the aim of the United States School Garden Army promoted by the Bureau of Education at Washington?* To strengthen boys and girls mentally, physically, morally, spiritually, through the school-directed home garden—education through production. The work

can not be done by other agencies than the school. To be done with any degree of efficiency will require many teachers. These working under the supervision of any agency other than the superintendents of schools and boards of education would create an impossible situation.

OUTLINE IN SUMMARY FOR GARDEN STUDY FOR CITIES AND LARGER TOWNS.

GROUP 1—GRADES 1, 2, 3.

Nature of Instruction.

Extensive rather than intensive. Acquaintance with the common birds, small animals, and plants which affect the gardens. A background of many and varied experiences desired. Introduce topics, as animals or plants, which touch the garden.

First-hand information, field observation, knowledge through doing stressed. Avoid mere telling.

Identification and oral expression practiced.

Aesthetics, spiritual, social emphasized, not economics.

Teacher should have garden in which to demonstrate all steps in preparation and care of garden, spading, raking, making rows, sowing seeds, etc.

Garden Phase.

Individual plats at school grow hardy quick-growing plants, such as radish, lettuce, sweet peas, nasturtiums.

First grade. Vegetables—Radish, lettuce, flowers—Nasturtiums, sweet peas. Study—Weeds, wild morning glory, wild lettuce. Birds—English sparrow. Lower animals—Gopher.

Second grade. Vegetables, new—Spinach, pumpkins. Flowers, new—Daisies, pansies. Study—Weeds, shepherd's purse, purslane. Birds—Linnet, robin. Lower animals—Mole.

Third grade. Vegetables, new—Carrots, beets, turnips. Flowers—Coreopsis, poppy. Study—Weeds, nightshade, foxtail. Birds—Meadow lark, bluebirds. Lower animals—Earthworm, bees.

Study germination of seeds.

GROUP 2—GRADES 4, 5, 6.

Nature of Instruction.

Continue to build educational background.

Identify and become acquainted with habits of the plants and animals common to the community, as these living things affect gardens. The children are interested vitally in the cabbage "worm," if it is attacking the gardens. Otherwise the children's interest in the insect is passive. Active interest is "Open sesame" to teaching.

Gradually the study should become more intensive and less extensive. Rather intensive study may be made of typical birds, insects, and plants. The relation of plants and animals to man or economics should be emphasized.

Arrange for inspection of home gardens by (1) teacher, (2) parents, (3) other interested adults, (4) or committees of children

Carry on project work, i. e., emphasize rabbit or chicken growing in connection with the gardens, or give attention to one economic crop.

By field and classroom experimentation teach the fundamental principles of agriculture.

Take excursions to adjoining truck gardens, farms, experimental plats, parks, etc.

Coldframes and hotbeds.

Garden Phase.

Individual and community plats at school or a demonstration plat where with least educational waste the children may be taught how and what to do at home.

Give most attention to home gardens.

Grow plants requiring more skill to produce than those of the previous grades.[1]

Commence the study of the fundamental principles underlying successful culture of plants.

Fourth grade. Vegetables, new—Onions, cabbage. Flowers—bulbs, chrysanthemums. Study—Birds and weeds, five new ones common to the community. Insects—life history of moths and butterflies. Lower animals—Toads and frogs.

Fifth grade. Vegetables, new—Cauliflower, rhubarb, kohl-rabi. Flowers—Phlox, stocks, zinnia. Study—birds and weeds, five new ones common to the community. Make intensive study of birds. Form Audubon Society.

By classroom and field experimentation teach movement of soil water and conservation on moisture, methods of irrigation, needs of plants, i. e., air, warmth, moisture, food, light.

Common intensive study of plant propagation.

Sixth grade. Garden plants—new corn, cucumbers, melons, tomatoes, berries. Flowers—roses. Study—birds and weeds, five of each common to the neighborhood. Insects—intensive study of typical insects common to the neighborhood.

Continue experimental study of agricultural practices such as fertilization of soil, cultivation, etc.

[1] It is advisable yet not necessary that garden instruction should be progressive, i. e., as a child advances in the grades he should meet new phases of plant culture. However, an expert gardener is not the end of the school-directed garden; therefore radishes in every grade from the first to the last may be grown as long as they serve some definite and desired purpose. The home gardener grows a few standard plants year after year. Likewise the farmer may grow corn year after year. No "deadly monotony" may be feared so long as a desired purpose is satisfied.

The garden projects directed by the school is not successfully carried out unless it leads the children to attempt new projects on their own initiative.

GROUP 3—GRADES 7, 8.

Nature of Instruction.

Intensive rather than extensive. Emphasize economic phase of plant and animal life.

Encourage home experimentation.

Organize a weather bureau—see typical lesson on same in part 2.

Garden Phase—Home Gardens—Experimental Plats.

Seventh Grade. Devote a large part of the time to the study of plant improvement, budding, grafting, artificial pollination, selection, etc.

Plant diseases caused by fungi, bacteria, and insects.

Experiment in gardens at school or at home with new plants which seem adapted to the community—rice, cotton, etc.

Grow economic plants, such as sugar beets, hemp, flax, etc. Harvest same. Compare school and business methods.

Eighth Grade. Careful observation of plants as affected by the weather. Experimental plats at school and at home.

AN OUTLINE IN DETAIL FOR GARDEN STUDY.

GROUP 1—GRADES 1, 2, 3.

Fall and Winter Terms or First and Second Quarters.

Outdoor Phase.

Fall preparation of the spring garden:

a. Removal of weeds and remains of cultivated plants. Burn the larger stuff and pile the rest aside for the compost heap.

b. Thorough spading of plat, mixing in manure, as soon as the ground is moist. Leave rough.

Selection of seeds: Collect seeds from the most typical and sturdy plants. Learn to identify the same. Place in envelopes for spring planting.

Fall treatment of the spring garden:

a. Finish the harvest.

b. If tender plants were planted in the spring or late summer guard them from frost.

Fall or late summer planting:

a. Lettuce, radish, and other hardy plants may be started in localities where weather conditions permit.

b. Start sweet peas.

Observational studies: Note how the plants have been affected by (1) insects, (2) birds, (3) gophers, (4) weather changes.

Related garden studies:

a. Identify the most common birds.

b. Identify the most common weeds.

c. Identify a few insects common to the community.

Indoor Phase.

Informal discussions of the garden site. Simple experiments to show (1) how much better water enters loose soil than tight, (2) value of fertilization, (3) needs of plants—air, light, water, food, warmth.

Study seed germination and dispersal. Make a collection of seeds illustrating the different methods of scattering. Mount on cardboards. Combine classroom and outdoor work.

Study methods used by plants in storing foodstuffs, root, stem, and leaf types. Review the life cycle of plants from seed to seed. What seems to be the end of a plant's life?

Bring to the classroom typical plants showing how the plant or their parts are getting ready to meet the winter-time—cold and lack of moisture.

Oral discussions. Drawings. Collect and press a few weeds. Collect cocoons, chrysalises, etc. Keep in lamp chimneys closed at the top with mosquito netting and inverted over potted plants.

Start a few hardy potted plants for the schoolroom.

On a sand table plan a farm and carry it out in miniature. The children will enjoy making the house and outbuildings and planting the crops. Artificial toy animals may be used.

GROUP 2—GRADES 4, 5, 6.

Outdoor Phase.

Fall preparation of the spring garden in all grades as in Group 1.

Fall treatment of the spring garden.

In addition to work as outlined for Group 1, study ways of conserving garden stuff over the winter.

Fall or late summer planting. Same as in Group 1.

Related garden studies. Same as Group 1, identifying new types.

Indoor Phase.

Grade 4.—Simple experiments to show (1) movement of capillary water interference of upward movement of water by clods and undecayed humus (make application to seed beds), (2) proper depth to plant seeds.[1] Continue work of Group 1 in which the children take an active interest. Take to the classroom a box of outdoor soil. Water freely as needed. Try to identify the many plants that grow. Plant hyacinths and other bulbs in pots, tin cans, or what not. See that each child has an individual bulb. Tin cans may be made presentable if covered with crêpe paper. In the culture of bulbs review principles of plant growth previously studied. The same principles are at work no matter the type of plant.

Grade 5.—Simple experiments to show (1) plants throw off moisture, (2) conservation of moisture by cultivation, (3) different ways for irrigation, the best way, (4) work of roots, stems, leaves, flowers.

Make bird and weed calendars.

Write to the U. S. Department of Agriculture at Washington and to the several] State agricultural colleges for lists of available bulletins. Index and file bulletins which will be sent on request. Study the aim and work of the institutions spoken of above.

Grade 6.—Continue experimental work. Be sure that application of the information obtained through experimentation is applied to the gardens. Each experiment should direct the children's garden work.

Plan and build a cold frame, a hot bed. Make simple insectaries and study the life histories of insects as repeated therein. Study the "balance" in nature. Control of harmful insects by beneficial ones will no doubt be illustrated in the insectaries.

GROUP 3—GRADES 7, 8.

Outdoor Phase.

See Suggestions in Groups 1 and 2.

Take excursions and study the community harvest of cereals, fruits, etc.

Indoor Phase.

Continue work of sixth grade as seems desirable. Study larger lessons as pointed out by animal and plant life. (1) Color protection, (2) aim of plant and animal life, (3) balance in nature, (4) survival of fittest, (5) special adaptations.

Propagate plants in boxes, the cold frame or hot bed. Study and care for potted plants. Study the work of experimental stations.

Make free use of bulletins. If a good text may be found which emphasizes practice, or doing things, introduce it in this grade.

Grade 8.—Weather study. The relation of winds, light, clouds, rain, snow, frost, heat, etc., on plant and animal life. Erosion, formation of soil. See type lessons on the "Weather." Organize a weather bureau and study the forces which take expression through the apparatus of the bureau.

Conservation of foodstuff—canning, drying, storing.

[1] Simple experiments are outlined in agricultural texts written for children.

GROUP 1—GRADES 1, 2, 3.

SPRING TERM OR THIRD QUARTER.

Outdoor Phase.	*Indoor Phase.*
Spring preparation of the garden: *a.* Laying out of school plats. *b.* Spading, raking, forming plats. Planting: *a.* Laying off rows. *b.* Trenching. *c.* Placing seeds. *d.* Pressing soil over seeds. *e.* Labeling rows.	Informal discussion of garden site, of preparation of seed bed, etc. The seed order. Make envelopes to hold the seeds and seed labels for the rows.
Related studies: *a.* Visits to adjoining truck gardens. *b.* Earthworm, ants, gopher, bees, mole, toad. *c.* Spring aspect of weeds and insects. *d.* Spring birds. *e.* Nature awakening. *f.* Effect of snow and rain.	Make an observational ant home and beehive. Keep colonies for observation. Illustrate a rainstorm with boiling water, steam, and a cold saucer.

GROUP 2—GRADES 4, 5, 6.

FOURTH GRADE.

Outdoor Phase.	*Indoor Phase.*
See Group 1. Emphasize home gardens. Use demonstration garden at school. Urge planting of standard easily grown vegetables and flowers. Watch the gardens carefully for insect pests. Start a wild-flower garden at school.	Informal discussions. Outline of typical garden plan developed by children under guidance of teacher. Put sketch on board. Preparation of seed envelopes and labels.
Related studies: *a.* Life history of toads. *b.* Effect of winter storms on the land. *c.* Insects and birds as they affect the gardens.	Prepare muslin frames. Make other devices to protect plants from birds, as suggested in lesson 27. Make drawings of the two typical mouth parts of insects—sucking and biting.

FIFTH GRADE.

Outdoor Phase.	*Indoor Phase.*
Spring planting of home gardens and type garden at school. See outline in summary for suggested plants to grow. Visit the best home gardens by groups. Related studies: *a.* Birds, weeds, insects, gophers, as they affect the gardens. *b.* Take field trips. Observe methods used by truck gardeners and farmers to control pests.	Study of bulletins relating to garden work. Assign subjects for oral discussion. Draw on the garden experiences for subject matter in composition, writing, for exercises in drawing, for typical problems in arithmetic, etc.

SIXTH GRADE.

Outdoor Phase.	*Indoor Phase.*
See Fifth grade. Give more attention to marketing. Study commercial handling of food products. Experimental school plats. Study (1) methods of irrigation, (2) fertilization, (3) improvement of the physical structure of soils. Propagate tomato and lettuce plants and other plants in the cold frame, which may be given an early start. Later transplant to home and school gardens along with plants started in the fall.	Discuss cooperative marketing. Oral discussion of assigned topics. Correlation as suggested in grade five.

SEVENTH GRADE.

Outdoor Phase.

Continue home garden work.

At school start a small nursery. Practice budding, grafting.

Start an economic plant garden at school. Grow sugar beets, cotton, hemp, flax, etc.; plants, of course, adapted to the community. Later extract the sugar from the beets, fiber from the hemp, etc.

Continue the experimental plats.

Indoor Phase.

Correlated with field work, study artificial pollination and other means of improving plants.

Continue use of a text (not mere reading.) Study organization of subject matter through the use of notebooks.

Compare the schoolroom and the business methods of manufacturing. School work should link up continually with the work of the community.

Review, as opportunity affords, the larger biological principles as suggested for the fall term work of this grade. Corelated with field work, study somewhat in detail plant diseases caused by fungi and bacteria.

EIGHTH GRADE.

Outdoor Phase.

Home gardening. Encourage large plats, experimental work; quality, not entirely quantity.

Indoor Phase.

Elementary science as centered on the weather bureau. Continue work started in the fall term.

GROUP 1—GRADES 1, 2, 3.

VACATION TIME OR FOURTH QUARTER.

It is inadvisable to attempt an ambitious gardening program during vacation time with the little people of grades 1, 2, 3. However, the parents should be urged to encourage their children to carry their gardens through to production.

GRADES 4, 5, 6, 7, 8.

Outdoor Phase.

Continuation home gardens. Garden visitation by (1) teachers, (2) parents, (3) other interested adults, (4) officers elected by the children, (5) committees of children appointed by the teacher.

Indoor Phase.

Regular meetings at school called by the teacher or garden inspectors, at which meetings (1) reports may be given, (2) pictures shown, (3) exhibits made, (4) garden luncheons held, etc.

OUTLINE STUDY OF VEGETABLES.

PLANT—BULB, POTATO, CORN, OR WHAT NOT.

a. Identification. Different varieties.
b. Uses.
c. Needs: (1) Air; (2) food; (3) moisture; (4) light; (5) warmth.
d. Cultivation: (1) Plowing, spading; (2) harrowing, disking; (3) weeding; (4) how performed, (a) tractor, (b) horse, (c) hand.
e. Food: (1) Fertilization; (2) physical and chemical condition of soil; (3) cover crops, inoculation; (4) rotation of crops.
f. Moisture: (1) Capillary water, (a) how conserved; (b) its function; (2) gravitational water, (a) how conserved; (b) its function; (3) irrigation, (a) sprinkling, (b) flooding, (c) trenching; (4) relation to humus, clay, lime, etc.
g. Light: (1) Open areas; (2) direction of planted rows; (3) crowding; (4) thinning.
h. Warmth: (1) Relation of humus, clay, sand, lime, cultivation, irrigation, etc.; (2) time to plant certain seeds.

General method of teaching.—Step 1. Teach principle under discussion by experimentation. Step 2. Make application to the child's plant project. Step 3. Show how the farmer makes application. Emphasize "doing." Experiment and demonstrate. Avoid mere telling. It is astonishing, the amount of one's second-hand information. How do you know that house flies breed in manure, that "wigglers" turn into adult mosquitoes, that seeds need air for germination? Few have had first-hand experiences and information. Many have been told. Give boys and girls first-hand information. Give them a fund of original experience. This fund of real experience gives them power to interpret and to meet new situations.

ORGANIZATION PLAN FOR SMALL CITIES AND TOWNS.

Garden Supervisor or Supervising Teacher (full time).
- Teacher-director in each school who is paid an extra salary for work during out-of-school hours and in vacation.
- Gardening program.
- Instruction and supervision by regular teachers.

TYPICAL GARDEN ORGANIZATIONS.

A PLAN FOR LARGER CITIES.

Five or more schools.

Garden Director (full time).
- Assistant Supervisor (full time).
  - One teacher paid for home garden supervision for each 100 pupils of garden age.
    - Teachers with gardening programmed for three periods a week of one-half hour each.
    - Regular teachers required to give garden instruction.
- Assistant Supervisor.
- Assistant Supervisor.

Directors, supervisors, and garden teachers should be employed by the year in order that continuation work may be carried on during the vacation time. Certainly the school should attempt no project which it does not complete.

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