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LESSONS IN GARDENING FOR THE CENTRAL STATES REGION

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LESSONS IN GARDENING FOR THE CENTRAL STATES REGION.

GARDEN MANUAL NO. 2.

The following 25 lessons in gardening are intended for the use of teachers and supervisors of gardening. They constitute Garden Manual No. 2 and are based upon the spring and fall manuals and the leaflets that have already been issued for the Central States region by the United States School Garden Army. The subject matter contained in each lesson can easily be taught during a 15-minute period by any teacher that has an interest in gardening.

These lessons can be made a part of the regular work in nature study, elementary science, elementary agriculture, or garden work. They are suitable for any grade above the third.

GROUP 1.—PLANTING AND CARING FOR THE CROPS.

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2. Turnips and rutabagas.
3. Sweet potatoes.
4. Tomatoes.
5. Beans.
6. Sweet corn.
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Additional garden helps for use of teachers and supervisors are indicated on the last page of this pamphlet.

LESSONS IN GARDENING FOR THE CENTRAL STATES.

GROUP I.—PLANTING AND CARING FOR THE CROPS.

Lesson 1: PARSNIPS.

SOIL AND CLIMATE.

Parsnips are very easily grown when the soil is made rich and mellow. When such conditions prevail they will grow in most any part of the country.

PLANTING AND CULTIVATION.

The seed may be planted as soon in the spring as the soil can be placed in good condition. Use ½ ounce of seed to 100 feet of row space, planting ½ to 1 inch deep. The plants should be thinned to 2½ inches apart. The plants taken out can be transplanted to other garden space. When this is done make the soil very mellow to a depth of 6 or 8 inches. Very loose mellow soil is necessary to produce smooth roots.

The rows should be 12 to 18 inches apart. Frequent cultivation is necessary. Plant a few radish seeds in the row as a marker, so that early cultivation may be possible.

The roots may be used in the fall, but their quality is improved if left in the ground until spring. This makes them sweeter. They should be removed, however, before they begin to grow, as sprouting will make them unfit for table use. Furthermore, they produce seed the second season, and if left in the ground the seed will get scattered and produce a weedy garden.

VARIETIES.

Hollow Crown and Sugar are leading varieties.

Lesson 2: TURNIPS AND RUTABAGAS.

TURNIPS.

SOIL AND CLIMATE.

The turnip does best in a cool, moist climate, but grows in nearly all sections of the country. The fact that it is hardy makes it a popular crop for cool latitudes. The crop is most successful in a rich, mellow soil.

PLANTING AND CULTIVATION.

Two crops can be raised in one year. For the early crop plant as soon as soil can be worked. Use one-half ounce of seed to 100 feet of row space. Plants should number 6 or 7 to a foot. Rows are usually 12 to 18 inches apart. The roots of the early crop will be ready for use before the weather gets hot. The late crop is usually sown broadcast on land occupied by early vegetables. Seed may be sown for the late crop from the last of July until the middle of August. Turnips should be covered one-fourth to one-half inch deep with fine soil. When sown broadcast, use 2 pounds of seed per acre. To get the quantity of seed necessary for your garden

space find what part it is of an acre. Stir ground frequently for the cultivation of an early crop. Keep free from weeds. When sown broadcast, pull weeds out by hand and use a hand hoe for loosening soil among the turnips, if it seems necessary.

VARIETIES.

The Purple-top Globe and White Globe are good turnip varieties.

RUTABAGAS.

The culture of the rutabaga is the same as for the turnip except the rutabaga requires a longer period and more room for growing.

VARIETIES.

The Kangaroo and Purple-top are leading varieties of the rutabaga.

Lesson 3: SWEET POTATOES.

SOIL AND CLIMATE.

The sweet potato grows best in the South because it is of a tropical nature. It is best adapted to a warm, well-drained, sandy loam soil. This crop is grown extensively for commercial purposes as far north as the southern boundary of Pennsylvania. It may be grown in a limited way for family use in southern New York and Michigan.

PLANTING AND CULTIVATION.

Sweet potatoes are usually planted in ridges 3 to 5 feet apart to improve the drainage condition. These ridges may be made, in case of a large garden, by throwing two plow furrows together; in a small garden by use of the spade, shovel, or hand hoe. A good application of fertilizer should be mixed with the soil of which the ridges are composed.

Plants should be started in a hotbed for their early development. This will insure a longer season for the crops' growth. Plants are placed 12 to 14 inches apart in the row. Cultivate frequently and thus keep the soil free from weeds and a surface mulch. After the vines cover the ground there is no further need of cultivation.

VARIETIES.

Improved Jersey and the Triumph are the leading varieties.

Lesson 4: TOMATOES.

SOIL AND CLIMATE.

Tomatoes are grown in nearly all gardens. Some gardeners have the best success with this crop when grown in a fertile sandy loam, with a well-drained clay as a subsoil.

PLANTING AND CULTIVATION.

Plants for home use may be procured by planting seeds in an indoor seed box eight weeks before time for setting in the garden. The plants when 2 inches high should be transplanted to another box, hotbed, or cold frame and placed 2 or 3 inches apart in this location. When the plants begin to crowd under these conditions, transplant each plant to a separate container. Use flowerpots or old strawberry boxes for this purpose. When all danger of frost is over, remove from pots, being careful to keep all dirt upon the roots. If berry boxes are used, cut

the bottom out of the box and place boxes in the row. The best method of setting, if the plants are to be pruned to one or two stems and staked up, is to place plants 18 inches apart in rows 3 feet apart. If plants are not to be pruned, place 3 feet apart in rows 4 feet apart. The advantages resulting from staking up and pruning are: (1) Fruit ripens earlier; (2) fungous diseases are diminished; (3) spraying, cultivation, and harvesting are more easily accomplished.

VARIETIES.

Early crops: Earliana. Medium and late crops: Red Rock, Globe, and Stone. The Stone variety is used for canning.

Lesson 5: BEANS.

Beans are divided into two general groups—the field type and the garden type. We will consider only the garden type in this leaflet. The two divisions of the garden type are bush and pole beans.

SOIL AND CLIMATE.

Beans are grown in all types of soil and in gardens in most parts of the world. They should not be planted on a rich muck soil, as they will go to vine; that is, many and large vines will be produced but few beans will grow. No type of bean can stand a heavy frost, hence it should not be planted until all danger of frost is over.

PLANTING AND CULTIVATION.

The bush varieties are more hardy than the pole and therefore can be planted earlier. The lima bean requires a long season for maturity. The dwarf varieties of the string type mature quickly, and hence are some of the first to be found on the market. When planting the bush beans place in rows 18 inches apart, one-half to 1 inch deep in the soil, using 1 pint to 100 feet of row space, with plants 6 inches apart. For pole beans plant in hills 4 by 4 feet apart and four beans in a hill, using one-half pint to 100 feet of row space. Cover beans 1 inch with fine soil. Drive an 8-foot pole 10 inches into the soil in each hill. Slant two poles in two contiguous hills and adjoining rows in such a way that they may be tied at the top in Indian wigwam fashion. The beans will climb and cling to the poles. Pole beans may be planted with sweet corn and the vines permitted to climb the cornstalks. They are occasionally merely planted in rows and the vines permitted to run on wire netting placed for this purpose. Beans should not be cultivated when the dew is on the leaves or when the vines are wet with rain. Frequent shallow cultivation is necessary.

VARIETIES.

Green (pole), Kentucky Wonder; green (bush), Green Pod, Red Valentine; lima (bush) Landreth, Burpee's Bush; lima (pole), Seibert, Ideal.

Lesson 6: SWEET CORN.

SOIL AND CLIMATE.

Sweet corn is grown over a large area and under many different soil and climatic conditions. Generally speaking, those conditions that favor field corn produce a satisfactory result with sweet corn.

PLANTING AND CULTIVATION.

The seed should be planted as early as the ground can be worked and the soil is warm. Use one-fourth of a pint of seed to 100 feet of row space, making hills 3 feet apart, planting four grains in a hill and covering seed 1½ inches deep. If corn is planted in rows the plants

should be thinned to 15 inches apart in the row. Sweet corn should be planted every three weeks until late summer. By this plan the family will have a continuous supply of the proper age for the table. Some gardeners accomplish the same result by planting early, medium, and late varieties. Sweet corn should be used as soon as possible after the ears are removed from the stalks. This gives it a better flavor.

Keep soil loose and free from weeds by frequent cultivation. After the last cultivation the soil can be pulled up around the stalks to give them greater support.

VARIETIES.

Early, Golden Bantam; medium and late, Country Gentlemen.

Lesson 7: CUCUMBERS.

SOIL AND CLIMATE.

The cucumber requires a rich, mellow soil and a warm climate for its best development. Stable or commercial fertilizers should be put in the cucumber hills or rows.

PLANTING AND CULTIVATION.

Cucumbers are easily injured by the cold; for this reason do not plant until all danger of frost is over. To secure an early crop, plant seed in plant bands, strawberry boxes, or inverted sods, and place these containers in an indoor box or hotbed. Transplant plants, leaving them in the containers, directly to the garden. When planted in the open in rows, use one-half ounce of seed to 100 feet of row space. Plant seed 1 inch deep and make rows 5 or 6 feet apart. Thin plants to stand 18 inches apart when planted in rows. When planted in hills use 10 or 12 seeds to the hill and thin to three strong plants per hill. Young cucumber plants are frequently destroyed in great numbers by the cucumber beetle, and hence it is important to have surplus plants in hills or rows.

Cucumbers should be given frequent cultivation while the vines are yet small. After the vines cover most of the row space the weeds that remain should be pulled by hand. During the early season the fruit should be removed from the vines before it is allowed to ripen. This stimulates the vines to greater productiveness.

VARIETIES.

Emerald, White Spine.

Lesson 8: MELONS.

SOIL AND CLIMATE.

The soil and climatic conditions, as well as the requirements for cultivation, insect and disease protection are about the same for melons as for cucumbers.

MUSKMELONS.

PLANTING.

Muskmelon hills should be placed 6 feet apart each way. Plant 10 to 12 seeds in each hill. Thin to four of the best plants in each hill. When planting in rows place same 6 to 8 feet apart. Thin plants to 20 inches apart.

VARIETIES.

Rockyford, Emerald Gem.

WATERMELONS.

PLANTING.

Watermelon hills should be 8 to 10 feet apart each way. Plant 10 to 12 seeds in each hill. Thin to three good plants in each hill. When planting in rows place same 8 feet apart. Thin plants to 30 inches apart in a row.

VARIETIES.

Tom Watson, Florida Favorite.

Lesson 9: PEPPERS.

SOIL AND CLIMATE.

Peppers grow well over a large part of the country. The plants are tender, therefore they should not be planted until after all danger of frost is past.

PLANTING AND CULTIVATION.

Pepper plants can be raised in an indoor seed box or in a hotbed. When this plan is taken to secure plants the seeds should be planted about eight weeks before the time for transplanting to the garden. Plants should be set 12 to 18 inches apart in rows. The distance between rows should be 2½ to 3 feet. Where seeds are sown in the open ground, use one-eighth of an ounce to 100 feet of row space, planting one-half inch deep. Peppers, under favorable conditions, mature in from 100 to 140 days.

VARIETIES.

Sweet peppers, Sweet Spanish and Bell or Bull Nose; Hot Types, Long Red Cayenne, Red Cluster.

Lesson 10: WHEN TO GATHER YOUR VEGETABLES.

If you take good care of your garden all through the season, following the directions given in this manual, you may expect to gather a good crop. This table tells you when to gather several kinds of vegetables that you will grow.

Crop.	Time to gather.	Remarks.
Beets	When young	Beet greens, when tender, make a delicious dish.
Brussels sprouts	After frost	Cold improves this vegetable.
Cabbage (early)	When three-fourths headed	May be left until frost.
Carrots	When young	Should always be gathered young when used for soups.
Chard	When outside leaves are about 1 foot high.	Cut lightly at first. Midribs of leaves can be used like asparagus.
Kohl rabi	Before skin hardens	The bulb should be about two-thirds as large as a baseball.
Lettuce	While leaves are tender	Small, young lettuce leaves make best salads.
Lima beans	While still green	Pods should be spongy at the tip.
Melons	When they crack around the stem	Let your melons ripen on stem if possible.
Potatoes	When vines are dry	Harvest a few at a time except at end of season.
Radishes	When young	Radishes get tough and spongy with age.
String beans	When they snap readily	Tips should be soft and easily bent or twisted.
Shell beans	When pods are well filled	Do not let them dry on vines.
Sweet corn	When it has just come to milk with blackened silks.	Should be used as soon as picked.

Lesson 11: SELLING YOUR VEGETABLES.

After your own home table has been supplied with all the vegetables that it needs you should sell your extra products as fast as they are ready for the market. Your home needs should be supplied first before you attempt to sell to your neighbors. If you raise enough vegetables to supply the needs of your own family you are doing a patriotic duty.

You should not only supply your family needs and pay for the cost of your garden, but you should make a neat profit on the vegetables you raise. Don't you think it would also be a fine idea to invest your vegetable profits in war savings stamps?

Most selling from our village or city gardens is done by peddling among our neighbors. This encourages thrift and business system on your part. It is a training that you boys and girls ought not to neglect. To sell your vegetables readily there are a few rules that should be followed.

1. Gather all vegetables when they are ripe and ready for the market. Do not pick half-ripe fruits; choose only those that are ready for a quick sale.

2. Grade your vegetables according to size and quality. Do not have a mixture of large and small sizes and good and poor vegetables.

3. Make your display of fruit attractive. Customers will buy more quickly and pay more if the goods offered for sale look neat and clean.

4. Do not put the best vegetables on top while poorer ones are hidden beneath. It would be better to separate the kinds and sell them separately.

5. Be honest. Do not claim for your goods what they will not show. Try to keep your customers by honest dealing.

6. Whatever boxes or baskets are used for selling or displaying your vegetables, make them attractive.

Build up a reputation for yourself for honesty and fair dealing.

Lesson 12: STORING YOUR VEGETABLES.

The storing of vegetables that are not used as soon as gathered is very important, as it is a fine way to lay up food for future use.

Potatoes, carrots, onions, beets, turnips, and many other of your garden products may be kept for winter use by storing. You will get the best results from storage if care is taken regarding the proper temperature and ventilation needed, the amount of moisture necessary, and the quality of the vegatables when first put in storage.

Some vegetables may be stored on your mother's pantry shelves, while others should be put in the cellar, and still others kept in outdoor pits. Sometimes several neighbors join together and build a pit or storage cellar for their vegetables. This is known as community storage. When several gardeners do this the cost to each is small and the vegetables can be handled more easily.

If you store your vegetables in the cellar, you must take care to see that there is enough ventilation and that the proper temperature may be easily kept. The cellar should have a good dirt floor, or, if it has a concrete floor, the floor should be covered with 3 inches of sand. This floor should be kept moist. Beets, celery, cabbage, parsnips, turnips, and potatoes may be stored in the cellar.

The best way to store vegetables outdoors is to use a pit. To build this, dig a hole in the ground 6 inches deep and as wide and long as necessary to hold the vegetables to be stored

when piled up. Before putting the vegetables in the pit it should be lined with hay or straw. Cover the piled vegetables with several inches of hay or straw, and then cover the mound with 4 or 5 inches of soil. As cold weather comes on, add 10 or 12 inches of soil to the covering of the pit.

GROUP II.—PREVENTING AND CONTROLLING INSECTS AND PLANT DISEASES.

Lesson 13: HOW TO KILL THE INSECTS.

Insects that feed on plants get their food in two ways. Some bite out pieces of the leaf, stem, or fruit; these are called biting insects. Others stick a pointed beak into the plant and suck up the sap; these are called sucking insects. Biting insects may be killed by putting arsenate of lead or other poison on the plant. Sucking insects are not hurt in this way, but must be killed by some poison which gets directly on their bodies.

Cabbage worms, flea beetles, potato beetles, celery caterpillars, and tomato worms are good examples of insects that bite plants. Aphids or plant lice, leaf hoppers, squash bugs, scale insects, and various plant bugs are good examples of insects that suck up the sap. As a rule, the biting insects are easier to kill than the sucking insects, because it is only necessary to dust or spray the plant at almost any time before the insects attack it. In the case of the sucking insects it is necessary to put the poison on the plants at the time when the insects are present and to repeat it until all are killed.

The best way to kill biting insects is to use arsenate of lead. This may be purchased from all seedsmen and florists, as well as at most hardware and paint stores, in either of two forms—a paste which is especially intended for spraying, or a dry powder which may be used either for spraying or dusting. The way to use arsenate of lead is told in the next lesson. One great advantage of arsenate of lead is that either as a liquid spray or a dry powder it may be put on the plants in almost any strength without danger of hurting them.

Lesson 14: HOW TO USE ARSENATE OF LEAD.

As you have learned in the last lesson, arsenate of lead is the best poison to kill insects that bite plants. It may be put on the plants in these ways:

1. Put the dry powder on the leaves and stems with a powder bellows, powder gun, or duster. The best time to do this is early in the morning before the dew has evaporated. Put the powder on thick enough to show a white coating on the plant. This is the easiest and simplest way to kill most insects that bite plants.

2. Spray the plants with lead arsenate powder in water by means of a small pump or hand sprayer.

Lead arsenate is preferred to Paris green by most gardeners. When this is used in powder form 10 teaspoonfuls (two-thirds of an ounce) to a gallon of water is recommended by the United States Department of Agriculture when only a small garden is to be treated. Repeat the application of the above material every two or three weeks if the worms and beetles continue upon the cabbage or other garden crops.

The adhesiveness of arsenate of lead is enhanced by the addition of a "sticker" of about the same amount by weight of resin, fish oil, or other soft or dissolved soap as of the arsenical used. The "sticker," according to Farmers' Bulletin No. 856, will prevent the foliage of cabbage and similar smooth-leaved crops from repelling the liquid. Without the "sticker" the poison may gather in drops and not be equally distributed over the foliage. A successfully treated foliage shows a thin white coating of the poison for some time.

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Lesson 15: THE APHIDS OR PLANT LICE.

The aphids or plant lice are probably the most generally troublesome garden insects. They attack nearly all crops and often cause the withering or death of the plants.

These aphids are sucking insects. Each has a sharp beak that it sticks into the leaf, stem, or fruit. Then it sucks out the sap. Although these pests are small, they increase in number very rapidly. Each gives birth to many young ones and these young aphids grow up in a week; so one aphid upon a plant may soon cause it to be covered with the little green, brown, or black flies. The large number of sucking beaks soon kills the leaf or plant.

Flowers as well as vegetables are commonly attacked by these little creatures. A black kind is often found in large numbers on nasturtiums. A brown kind attacks chrysanthemums. Several sorts of green aphids may be found on other flowers.

Because these pests get their food by sucking the sap instead of biting out pieces of the leaf they can not be killed by putting poisons like arsenate of lead or Paris green on the surface of the plant. When you spray or dust such arsenical poisons on potato leaves the bits of poison are eaten by the potato beetles and the beetles die; but the aphids or any other sucking insects simply push their beaks between the bits of poison to reach the sap within the leaf, and are not hurt by such poisons.

A good thing to use to kill aphids is the nicotine poison in tobacco.

In using nicotine washes or sprays against these little pests you must not be content with spraying but once. You should spray your plants two or three times, because if only a few aphids are left they will soon multiply into a great number.

You should use a sprayer that makes a fine mist which will reach all parts of the plants that are being attacked. In the case of vine crops, like melons and cucumbers, you should also spray the under surfaces of all leaves.

Kerosene emulsion described in the next lesson is also recommended for destroying sucking insects.

Lesson 16: HOW TO USE KEROSENE WASH OR EMULSION.

Kerosene, like other oils, kills any insects that it touches. The oil goes through the breathing tubes to all parts of the body, causing death. But kerosene alone also kills the green parts of leaves and stems, so it can not be used alone on crops that are being attacked by insects.

When kerosene and hot soapsuds are mixed together, they make a wash or what is called an emulsion which you can put on the green surface of plants without hurting them. This mixture is still strong enough to kill the insects.

To make a supply of kerosene emulsion you will need a pail, a small spray pump, and a place to heat water. The emulsion is easily made by following these directions:

Heat one-half gallon of water to boiling. Slice half a bar of soap into pieces and stir it in the water until dissolved. Take it from the fire and pour this hot soapsuds into a pail into which you have put a gallon of kerosene. Then pump the mixture back and forth into the pail until the kerosene is thoroughly mixed with the soapsuds, forming an emulsion.

When the emulsion is made, it can at once be diluted with water, mixing easily while still warm. One part of the emulsion should be mixed with 10 parts of water.

When the emulsion cools, it becomes a jellylike mass, like soft soap. This will keep for months if stored in a cool place. Some of it may be used at any time, diluting with 10 parts of water to 1 part of emulsion. If it is first mixed with a little hot water it dilutes more easily.

A small amount of kerosene emulsion may be made by dissolving 1 cubic inch of soap in half a pint of hot water and then shaking hard with a pint of kerosene until thoroughly mixed. This is then to be diluted with 10 parts of water.

Lesson 17: PLANT DISEASES INJURIOUS TO GARDEN CROPS.

Bean.—Bean anthracnose is a fungous disease which attacks the stem, leaves, pods, and seeds of the bean plant. The disease may be detected by the spots or cankers that have pink centers surrounded by a darker reddish border. This disease may be prevented by selecting healthy seed and by rotation of garden crops. Bean blight produces irregular, diseased areas, which, according to Farmers' Bulletin No. 856, at first have a water-soaked appearance, but later dry out and become brown and brittle. When bean seed is affected with blight, it shows yellow, diseased blotches and sometimes becomes entirely yellow and shriveled up. The same method of control as was suggested under anthracnose is recommended for bean blight.

Downy mildew sometimes attacks Lima beans. Applications of Bordeaux mixture at 10-day intervals are recommended for the prevention of mildew.

Cabbage.—Clubroot is the most common disease of the cabbage and turnip. The remedy is rotation of garden crops and an application of lime to the soil. Black leg, yellows, black rot, and soft rot of the cabbage may be prevented by using clean seed, a disease-free soil, practicing crop rotation, and by destroying all old stalks in the fall of the year.

Onion.—Onion smut and downy mildew are serious diseases of the onion. Smut attacks the entire plant and prevents its proper growth. This disease may be prevented by treating the seed with formalin solution at the rate of 1 ounce of formalin to 1 gallon of water. Soak seed 20 minutes in this solution. The mildew may be prevented by spraying with Bordeaux mixture.

Irish potato.—For both early and late blight, spray with Bordeaux mixture, using a small hand sprayer where only a small garden is being cultivated. To prevent early blight, spray first when plants are 3 or 4 inches high; follow with two or three other sprayings about two weeks apart. If late blight is observed, it may be necessary to spray four or five times with Bordeaux mixture. These applications, as in the case of early blight, should be two or three weeks apart.

Tomato.—The tomato is subject to injury from several plant diseases, most of which may be prevented by regular applications of Bordeaux mixture. This mixture should be applied to plants shortly after they come up in the seed box and every two weeks thereafter until the crop is harvested.

Turnip and rutabaga.—Clubroot is the most serious disease of the turnip and rutabaga. The remedy applied is the rotation of garden crops and the application of lime.

Lesson 18: INSECT ENEMIES OF GARDEN CROPS.

Bean.—The most serious insect enemy of the bean is the bean weevil. This can not be controlled in the field or garden. As soon as the crop is harvested the beans should be fumigated with carbon disulphide. For details on this process see Farmers' Bulletin No. 799.

The bean ladybird, bean leaf-beetle, and blister beetle may be controlled by use of arsenate of lead. When beans are young the vines are very tender, therefore, at this stage the preparation should be applied at one-half strength to avoid burning the plants.

The bean aphis is a plant louse that may be controlled by the use of nicotine sulphate. For a small garden use one teaspoonful of nicotine sulphate to a gallon of water, to which a 1-inch cube of hard soap, which has been thoroughly dissolved, should be mixed with the poison. For a larger garden 1 fluid ounce to 8 gallons of water is recommended by Farmers' Bulletin No. 856. When this amount is used one-half pound of soap should be dissolved in the poison mixture.

The melon aphis, pea aphis, cabbage aphis, turnip aphis, and spinach aphis may also be controlled by use of nicotine sulphate, suggested for bean aphis.

Beets.—The beet army worm and several forms of web worm damage the beet. They may be controlled by use of arsenate of lead. Flea beetles are very destructive to the beet. They may be destroyed by spraying with Paris green.

Cabbage.—The cut worm, cabbage worm, cabbage looper, flea beetles, and plant lice are perhaps the greatest insect enemies to the cabbage. Cutworms cut off many plants in the spring garden. They may be poisoned with bait placed near the plants. This bait is prepared by mixing with one quart of bran, moistened with sweetened water, one teaspoonful of Paris green. Garden plants may be protected from cutworms by wrapping paper around the stems of the plants. The paper should be placed about 1 inch below and 2 inches above the surface of the soil.

To prevent the cabbage butterfly from depositing eggs upon the cabbage we suggest the use of fine air-slaked lime, road dust, wood ashes, or powdered tobacco leaves.

To poison the cabbage worm, cabbage looper, and flea beetles, mix Paris green with lime or ashes at the rate of one tablespoonful of Paris green to 1 pint of lime or ashes. This material should be dusted on the plants early in the morning when the dew is still upon the leaves.

To destroy the plant lice, known as cabbage aphis, turnip aphis, and spinach aphis, as well as the leaf bugs, leaf hoppers, and thrips, spray plants with dissolved creosol soap or resin fish oil soap at the rate of 1 pound to 6 gallons of water applied as a spray.

Carrots.—The cutworm sometimes does considerable damage to carrots. If they are present use the cutworm bait.

Cucumbers.—The striped cucumber beetle and the twelve-spotted cucumber beetle are the greatest insect enemies to the cucumber. If only a few plants are included in the garden, make small frames and cover with cheese cloth to protect the plants from the beetles. A solution made by mixing arsenate of lead and a small quantity of Bordeaux mixture will repel attacks from the beetle and prevent injury to the foliage.

Protecting the plants from the beetles aids in keeping the plants free from diseases. If wilt, anthracnose, and downy mildew appear, spray with bordeaux mixture.

Melons.—For melon insect enemies and plant diseases and the control of same, see under cucumber.

Onion.—Onion maggots frequently do considerable damage in some soils. If they are discovered we recommend the discontinuing of the growing of onions in the particular area infested for a period of two or three years. In the space usually planted in onions other vegetables should be grown. By this plan the maggots will probably disappear.

Parsnips.—The parsnip is not seriously injured by insect enemies or plant diseases. If webworms appear, spray with arsenate of lead.

Peas.—The pea aphis or weevil are the most serious enemies of the pea. Kerosene emulsion applied to both sides of the leaves will prevent attacks of the aphis. Sprinkling the young plants with water in which tobacco leaves have been soaked sometimes prevents serious injury to the pea vines. The pea weevil injures the pea seed while in storage. To destroy this weevil use 1 or 2 ounces of bisulphide of carbon to 100 pounds of seed.

Potato.—The Irish potato has many enemies, but the Colorado potato beetle and late blight are considered the greatest. For the Colorado, blister, and flea beetles spray with Paris green or arsenate of lead. Repeat spraying application every two weeks if beetles continue to appear.

The cutworm frequently cuts off many potato plants. For the control of this pest see under cabbage.

Tomato.—Flea beetles, tomato worms, and cutworms are common insect enemies. Flea beetles and tomato worms may be controlled with arsenate of lead. For the use of this poison see lesson 14.

Turnip and rutabaga.—The insect enemies of the cabbage also injure the turnip and rutabaga. Clubroot is the most serious plant disease of the turnip and rutabaga. The remedy for this disease is the rotation of garden crops and the application of lime.

GROUP III.—GETTING READY FOR NEXT YEAR'S CROP.

Lesson 19: HUMUS INCREASES THE CROP.

Humus is simply the decayed or decaying parts of plants or animals in the soil. Even if derived directly from animals it came first from the growth of plants. The black leaf mold on top of the soil in the woods is almost pure humus in an early stage of decay. The black soil in swamps is also nearly pure humus in a late stage of decay.

The great trouble with most of our poor soils is that the supply of humus has been exhausted. The first duty of many soldiers in the United States School Garden Army is to furnish humus to such soils. Old leaves, straw, grass, animal, or plant refuse of any kind—even garbage when it can not be used to feed pigs or poultry—may be worked directly into the soil or made into a compost heap, which you have already learned about, to decay and be dug in later.

An appalling waste of humus is taking place all the time. We throw it away. We burn it. We let the rivers carry it off. We neglect to produce it as we should.

Save the fallen leaves, the sweepings from unoiled streets, grass cut from the lawn, and add these to the soil each year, and the garden will produce a good return for the time and energy spent.

Lesson 20: MANURES PAY DIVIDENDS.

All garden crops require a rich soil, well supplied with humus. Humus is decayed vegetable or animal matter. Barnyard or stable manure is the best garden fertilizer because it furnishes this humus. In some places it is impossible to get manures for the garden, and you will have to use commercial fertilizers and materials from the compost heaps, which have been described.

When manures are selected for your garden you should take care that there is nothing in them that will hurt the soil. Sawdust and shavings in manure tend to make the soil sour. If the manure used comes from stables, all shavings and sawdust should be removed if possible. The manure from sheep, pigeons, and chickens contains a great deal of food that the plants use. These manures are more valuable than the ordinary barnyard manures, but must not be spread too thickly over your garden.

It is generally customary to work coarse manure into garden soil in the fall so that it will have time to decay. In the spring, well rotted manure can be worked into the soil with a digging fork. The amount of manure necessary for your garden will depend upon the condition of the soil. Poor worn-out soils will necessarily need more than rich, mellow soils. From 20 to 30 tons of manure an acre is generally very satisfactory. This means about a pound of manure to every square foot of garden space.

Humus may be added to the garden soil by planting what is known as a leguminous crop. Cowpeas, soy beans, and vetch are excellent crops for this purpose. Such crops take nitrogen out of the air and store it in their roots. After these crops are plowed into the soil the nitrogen is said to be "fixed" and young growing plants can use it as they need it. This plan of putting humus into the soil is followed only between cropping times and can not be successfully used to any great extent while your garden is in action. When green crops are thus plowed or spaded into the soil we call it green manuring.

Lesson 21: HOW TO MAKE YOUR HOTBED.

If your garden does not have a hotbed for raising early plants, you should build one during October when time can be given to it. Making a hotbed is not difficult and gives you a fine opportunity to show how much of a carpenter you are. Every garden supervised by the school authorities should have a hotbed and the building of this should be one of the earliest garden duties. If your bed is properly made in the fall it will be in excellent condition for the next spring work.

In making your hotbed a pit is dug from 2 to 3 feet deep and from 5 to 6 feet wide. Glass sashes are used to cover the pit. These sashes are generally 6 feet long and 3 feet wide, but other sizes may be used if necessary. Make the pit long enough to fit the size of the sash chosen.

Place a 2-inch plank, 12 to 15 inches wide, on edge, on the north side of the bed. Then on the south side of the pit place a plank about half the width of the one used on the north side. The sash, resting on these boards, will then slope toward the south and you will get better results from the sunlight. The ends of the bed are closed with boards cut to fit snugly, and soil is banked up all around the framework to keep out the cold. The pit should be dug and the framework arranged in the fall.

The sashes may be hinged at the top and held up by strong sticks when the pit is opened, or they may be hinged on the side and thrown back when the pit is opened. Sometimes the sashes are made to slide in and out on strips of wood set into the sides of the hotbed. The opening of the sashes is necessary to ventilate the bed properly and to allow you to work in the pit.

About 10 or 12 weeks before the time of outdoor planting the pit should be filled with well-heated stable manure. This manure is covered with 6 or 8 inches of rich soil, finely powdered. Keep the soil moist while it is being heated by the fermenting manure. Keep a soil thermometer in the pit and carefully read the temperature from day to day. When the temperature falls to 90° or 85° it is safe to sow your seeds. If the bed has been properly made, it will give out enough heat to grow plants during a period of five or six weeks.

If you can not buy glass sashes, you can stretch strong white canvas across the pit.

Lesson 22: HOW TO MAKE YOUR COLD FRAME.

A cold frame is made like a hotbed, except that no manure is used. Enough heat is secured from the sun.

A cold frame is used to harden plants that have been grown in a hotbed, or to continue the growing of certain plants during the winter months. If you should take plants like the tomato directly from the hotbed and plant them in the open field, they would probably die. They can not stand the quick, great change from warm to cold conditions. If, however, such plants are first hardened by being transplanted to a cold frame, they are able to stand a good deal of cold without injury.

Cold frames should be made in the fall so that they will be ready for spring work. It is sometimes well to have two or three cold frames in your garden, especially in the North, as they will save your plants during the cold spells of spring.

In the middle of the day, when the air is warm, the glass or canvas above the frame may be raised. This gives the plants a better ventilation and at the same time hardens them. As night comes on the plants should be covered. Later on the frames may be kept open for a large part of the day, but only when the day is warm. Before the plants are taken up and planted in your garden the sashes should be kept off the frame for several days.

Vegetable seeds may be planted 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 better if grown entirely in a cold frame. They may be protected from frost, from too much heat, and from birds.

In many of the Northern States you can not grow plants in a hotbed or cold frame during winter unless more protection is given. This is sometimes done by placing straw or hay over the glass. Hay mats are very useful for this purpose.

Lesson 23: HOW TO KEEP JACK FROST AWAY.

With some thought and care your garden may be kept producing after the first light frosts of the fall, and the same attention will save plants from the late spring frosts. There are several ways of protecting your plants from frost that will make the garden season longer. During the time when frost may be expected you should read in the papers what the weather man says and see whether he thinks there will be a frost. After a while you may be able yourself to tell when to expect a frost.

Thousands of dollars have been saved by growers, especially in the western parts of the United States, through the use of what are called smudge pots. This is done by putting cans that will hold a gallon or more of oil in different parts of your garden. Place about one can to each 25 square feet of garden space. Fill the cans with a light crude oil, which should cost about 5 cents a gallon. Keep the cans covered. When the thermometer reaches the danger point and a frost is expected throw a tablespoonful of gasoline on the oil in the can and light with a torch. The oil will burn in these cans from three to five hours. Put a thermometer in the coldest place in your garden. Watch the temperature to see whether or not it rises or falls. If the temperature continues to fall, keep the cans going by refilling until the danger point is passed.

Cheesecloth, muslin, sacking, or newspapers thrown over garden plants, such as tomatoes and fall-bearing strawberries, will keep them from being killed by frost. Where your plants are very small use muslin that has been placed over light wood frames. Large frames may also be made to cover several plants at a time. In spring small potato plants just coming through the ground may be protected by covering them with soil, which should be taken off as soon as the danger of frost is over. Tin cans and fruit boxes placed over small plants a night will protect them from frost.

If frosted plants are sprinkled freely with water before the sun rises they may often be saved from absolute loss. It is claimed that if the garden is irrigated while the temperature is at a danger point garden plants may be protected by the water used.

By using some plan of protecting your plants from frost for a few nights the growing season may be made several weeks longer. In many places there will be one or two frosts that might kill all your plants, followed by a long period of warm weather. If your garden can be protected during these few nights, much more produce will be secured from the garden during the season.

Lesson 24: PLANNING FOR NEXT YEAR'S SEEDS.

Last spring many Congressmen received requests for seeds from members of the United States School Garden Army. Most of these requests came so late that the seeds could not be furnished because the supply was exhausted.

To avoid a repetition of this experience the following suggestions are made to teachers and garden supervisors:

1. After school opens let the pupils discuss—perhaps in connection with their language lessons—the crops which have been most satisfactory.

2. Work up a collective statement of the amount of food raised by the Garden Army Company, developing the topic in connection with arithmetic. Be critical of the reports each pupil makes.

3. After a full discussion make a blackboard list of the kinds of crops the pupils wish to raise another year.

4. Have the pupils appoint a committee of three to write to their Congressman. This committee may well consist of the officers of the company. Suggest that they tell him of their garden experiences as members of the United States School Garden Army, and that the pupils would like a supply of certain seeds for next spring, naming the seeds on the blackboard list.

5. Instead of letting the officers write the letter, all the pupils might be allowed to write it as an exercise in letter writing, and the three best letters be sent.

6. In either case inclose with the letter a copy of the collective statement as to the food raised by the company.

7. This opportunity should be utilized as a lesson in civics, letting each pupil learn the number and the geographical limits of the congressional district in which the school is situated and the name of the Congressman now representing the district.

Lesson 25: 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

SUGGESTIONS AS TO ORGANIZATION.

The following suggestions are submitted to teachers and supervisors in the hope that they may be helpful in promoting the organization of the unit companies of this army:

Number of members in a company.—Ten to one hundred and fifty.

Age limit.—Any school child, but preferably the more important companies should be enlisted from the pupils above the third grade.

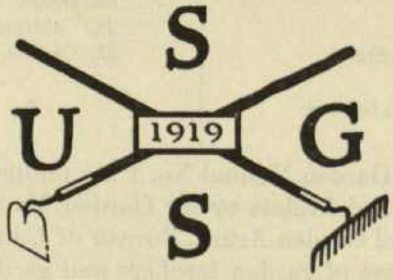
Requirements for enlistments.—The signing of an enlistment sheet in which the pupil agrees to raise one or more food crops and to keep records of his work and the results, reporting them to the teacher or garden supervisor. These sheets will be furnished by the Bureau of Education.

A company.—The maximum number of soldiers in a company is 150.

Officers.—Each company to have a captain and one or more lieutenants, the latter depending upon the number of soldiers enlisted.

Insignia.—For the private, a bronze and black enameled bar with U. S. S. G. on it. For the second lieutenant, a bronze bar with one star in the border. For the first lieutenant, a bronze bar with two stars in the border. For the captain, a bronze and black enameled double bar. These insignia will be furnished by us upon request, stating the number of enlisted garden soldiers.

Enlistments of existing organizations.—Any organization of school children now doing garden work will be eligible to enlistment. Such organizations may keep their existing form, if they so desire, and have the additional impetus of belonging to a national army fostered by President Wilson, the Secretary of the Interior, and the Commissioner of Education. The aim of this army is to nationalize and unify the great work now being carried on among the school children of America.



GARDEN HELPS FOR CENTRAL STATES REGION

The leaflets and lessons mentioned below are for the use of garden teachers and garden supervisors.

Titles of leaflets published in mimeograph form and not contained in Garden Manuals No. 1 and No. 2 are as follows:

Caring for the Garden.
Celery.
Kale and Cauliflower.
Collards and Brussels Sprouts.
Some Neglected Garden Crops.
Rotating Garden Crops.
Garden Products and By-Products.
Watering the Garden.
Keeping the Garden Records.
Harvesting Root Crops.
Harvesting Vine Crops.
Producing Your Own Seed.
Fall Garden Work.
Composition of Vegetables.

Each of the above is published separately.

Titles of the 25 lessons which constitute Garden Manual No. 1.

GROUP I.—GETTING READY TO PLANT.

Lesson 1. First Catch Your Rabbit.
2. How to Prepare Your Garden.
3. How to Plan Your Garden.
4. Companion Crops.
5. Succession Crops.
6. A One-Crop Plan for a Small Garden.
7. A Double-Crop Plan for a Garden 60 by 50 Feet.
8. Buying Garden Seed.
9. Quantity of Seed to Buy.
10. Varieties of Seed to Buy.
11. When to Plant in the Central States.
12. How to Plant.
13. Commercial Fertilizers for the Garden.
14. Testing Garden Seed.

GROUP II.—PLANTING AND CARING FOR THE CROPS.

Lesson 15. Growing and Transplanting Plants.
16. Thinning the Crops.
17. Replanting the Crops.
18. Lettuce.
19. Radishes.
20. Peas.
21. Onions.
22. Irish Potatoes.
23. Beets.
24. Cabbage.
25. Carrots.

The 25 lessons constituting Garden Manual No. 1 are published in one pamphlet. Address all requests for the mimeographed leaflets or for Garden Manual No. 1 and Garden Manual No. 2 to the United States School Garden Army, Bureau of Education, Washington, D. C. All garden helps are furnished for use of garden teachers and garden supervisors and not for the use of pupils.

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