

U. S. S. G.

THE FALL MANUAL  
OF THE  
UNITED STATES  
SCHOOL GARDEN ARMY



WASHINGTON

DEPARTMENT OF THE INTERIOR

BUREAU OF EDUCATION

A Garden for Every Child.  
Every Child in a Garden.

WASHINGTON

GOVERNMENT PRINTING OFFICE

1918

# UNITED STATES SCHOOL GARDEN ARMY

---

## ADMINISTRATIVE OFFICIALS

FRANKLIN K. LANE,  
*Secretary,*  
*Department of the Interior.*

PHILANDER P. CLAXTON,  
*Commissioner,*  
*Bureau of Education.*

JOHN H. FRANCIS, *Director.*

---

## REGIONAL DIRECTORS

CLARENCE M. WEED,  
*Northeastern States.*

FREDERICK A. MERRILL,  
*Southern States.*

LESTER S. IVINS,  
*Central States.*

CYRIL A. STEBBINS,  
*Western States.*

JOHN L. RANDALL,  
*Southeastern States.*

---

## REGIONAL AREAS

*Northeastern States:* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia.

*Southeastern States:* Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi.

*Southern States:* Tennessee, Kentucky, Missouri, Arkansas, Louisiana, Kansas, Oklahoma, Texas, Colorado, New Mexico.

*Central States:* Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Nebraska.

*Western States:* Montana, Idaho, Wyoming, Utah, Nevada, Arizona, Washington, Oregon, California.

---

**A Garden for Every Child.  
Every Child in a Garden.**

## FALL MANUAL OF THE UNITED STATES SCHOOL GARDEN ARMY

---

### A LETTER FROM PRESIDENT WILSON

THE WHITE HOUSE,  
Washington.

25 February, 1918.

MY DEAR MR. SECRETARY: I sincerely hope that you may be successful through the Bureau of Education in arousing the interest of teachers and children in the schools of the United States in the cultivation of home gardens. Every boy and girl who really sees what the home garden may mean will, I am sure, enter into the purpose with high spirits, because I am sure they would all like to feel that they are in fact fighting in France by joining the home garden army. They know that America has undertaken to send meat and flour and wheat and other foods for the support of the soldiers who are doing the fighting, for the men and women who are making the munitions, and for the boys and girls of western Europe, and that we must also feed ourselves while we are carrying on this war. The movement to establish gardens, therefore, and to have the children work in them is just as real and patriotic an effort as the building of ships or the firing of cannon. I hope that this spring every school will have a regiment in the Volunteer War Garden Army.

Cordially and sincerely yours,

WOODROW WILSON.

HON. FRANKLIN K. LANE,  
*Secretary of the Interior.*

**A LETTER FROM SECRETARY LANE**

DEAR BOYS: I am glad to receive your letter and to know that last year you had a garden plot and that this year you intended to have another. There are boys and girls in Belgium and in France who had garden plots, but those have been blown up by shells, and some of the boys have been killed, too. You can make gardens now, and the boys and girls of France and Belgium will for all time be grateful to you. But your gardens will not be blown up. The more we raise here the more we will have to make strong the arm of our soldiers across the water. That is the reason that we are trying to organize the boys and girls into a school garden army—they really will be soldiers, although not old enough to fight. We who stay at home have a very safe place compared with the boys in France, and our gratitude for this safety is shown by the work that we do.

The idea just comes into my mind that perhaps you know some soldier who has gone to France, and you might name your garden plot after him. Don't you think that this would be a good idea?

Cordially yours,

FRANKLIN K. LANE.

TO MILTON AND CARROLL TIMBERMAN,  
2698 Valentine Avenue, New York, N. Y.

(4)

(13)

## HOW TO PLAN YOUR GARDEN

### A LETTER FROM COMMISSIONER CLAXTON

*To Boys and Girls in the Schools of the United States, Greeting:*

We are now engaged in the greatest war in the history of the world. Your freedom and happiness depend on the result. If we win, the world will be free. If we lose, all the world will soon be in bondage to the autocratic German Government, and the freedom for which our fathers fought will be gone. Our young men are going to fight in France and Italy and on the seas. Older boys and girls will work in the fields, factories, mines, shops, stores, and elsewhere, to produce food, clothing, coal, and munitions of war. Most important of all is food. Without it soldiers can not fight, workmen can not produce ships, guns, and shells; and men, women, and children will die. The people of the United States must this year produce more food than they have ever produced before. The President of the United States is therefore asking all boys and girls from 9 to 16 years of age in cities, towns, and villages to join the United States School Garden Army and grow vegetables, berries, fruits, and poultry. There are 7,000,000 such boys and girls. If 5,000,000 of these volunteer, it will be the largest army ever raised in the United States and larger than all other boys and girls' clubs combined. By hard work and with wise direction they can produce food enough to feed all the hungry children of Belgium. Will you join the United States School Garden Army? Your teachers will tell you about the plan.

A happy spring, summer, and fall of joyous, useful outdoor work for you all.

Yours sincerely,

P. P. CLAXTON,

*United States Commissioner of Education.*

## 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 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 to help win the war.

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.

## HOW TO PLAN YOUR GARDEN

Many of us think of gardening as work to be done only during a few brief weeks in the spring. This is wrong. Your garden will do its best for you if plans for it are made in the autumn and much of its preparation done then.

Here are some things you should think of in planning a garden:

1. *Size.*—The average boy or girl can easily spade and care for a garden 10 by 30 feet. A garden of this size will go far to supply vegetables for a family of four. Your garden should be sufficiently large to grow enough vegetables to make it worth while, but not so large as to make its care too much of a task.

2. *Width between rows.*—Rows must be farther apart if a horse or hand wheel cultivator is used than if you use hand tools, such as a hoe or rake.

3. *Paths.*—Since your plants must receive personal attention you should plan your garden with paths so that you can reach all parts of it without tramping down the plants.

4. *Rotation.*—This means using the same ground for the growth of one kind of crop, followed by another of a different kind, as a crop of corn followed by a crop of beans. 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 schemes should avoid growing the same kind of plants over and over on the same ground.

5. *Keeping your garden at work.*—A planting calendar will tell you how, by second and third sowings, you can have fresh vegetables at all times during the gardening season.

6. *Use all your land.*—Vegetables which ripen quickly may be grown among those which ripen slowly. Thus lettuce, radishes, spinach, and like vegetables may be planted in the soil between tomato plants, potatoes, corn, etc.

7. *Plants to grow.*—The kinds of plants to be grown will determine very largely the nature of your plan. Radishes and lettuce may be planted closer together than cabbages or corn.

8. *Adding a touch of beauty.*—Finally, if you wish to make your garden not only productive but attractive, flowers may be grown about the borders.

## HOW TO PREPARE YOUR GARDEN IN THE NORTH

The soil for your garden should be spaded or plowed if possible in the fall. If this can not be done, then you should do it as early in the spring as possible. If your garden is too small to be plowed with a team, you should spade it deeply with a spading fork. Deep plowing and spading, followed by thorough harrowing and raking, puts the soil in the best condition to make your plants grow. When the soil is spaded, each spadeful as it is turned over should be broken up by striking with the back of the spade. When your garden soil crumbles in your hands, it is just right.

Vegetables are heavy feeders and, therefore, they need a rich soil. Many experienced gardeners use what is known as compost on their gardens. A compost heap is made of a mixture of meadow sod, leaves, straw, grass, lawn clippings, unused portions of food and vegetables, sweepings from uncoiled streets, lime or wood ashes, stable manure, and soil. The plan usually followed is to first spread out a layer of manure about four inches deep, then one of leaves or straw or vegetable waste. Upon these sprinkle a small quantity of lime or wood ashes; then follow with a layer of earth an inch or two thick. Repeat this until all your material has been arranged in layers and placed in piles. Alternate layers of leaves or straw prevent the plant food contained in the stable fertilizer and street sweepings from being washed out and lost.

Turn over your compost heap with a spading fork about twice a season. This mixes the materials more thoroughly and makes them decay more. In a dry climate you should pour water on the heap occasionally.

As soon as part of your compost heap has rotted down enough to mix readily with the soil it should be spaded in wherever needed. The coarser portions which are slow to decay may well be buried in the bottom of border beds for perennial flowers or vegetables.

The thorough working into the soil of any stable or commercial fertilizer is important. Garden soils composed largely of clay are very likely to be sour, but you can fix this by putting one pound of air-slacked, burned, or hydrated lime; two pounds of ground limestone; or three pounds of unleached wood ashes on every twenty-five square feet of garden space. Coal ashes will help to loosen up a clay soil.

The proper preparation of the soil and thorough working of all fertilizers into the soil are of utmost importance. The success of your garden will depend very largely upon the thoroughness with which your seed bed has been prepared.



## KEEPING YOUR GARDEN AT WORK IN THE SOUTH

Every southern home should have a fall garden. That cold weather is coming is not a good reason to stop growing crops and to allow weeds to take your garden. Autumn is really another growing season and your garden would produce at least a fourth more vegetables by keeping the land at work during this season of the year.

Garden soil kept under cultivation in the fall is in better condition for spring use. It should be cleared of all dead vines and other trash as soon as summer crops are gathered. Fall cultivation will help to destroy insects as they live in winter in trash heaps or under the surface of the soil. Cultivating the soil breaks up this surface and throws these insects out of their winter homes.

Your late garden work should consist of three things:

1. Taking care of your crops on hand.
2. Planting other crops in their place.
3. Getting ready for your next year's work.

You should try to put a fall crop in the space of every gathered crop. Keep your land working. You should also pick out your fall crops with an eye to your next year's plantings. It is well to have a definite plan for your fall work, just as it is important to plan definitely for your spring and summer work. July is about the first month in the South when you should begin to plan for your fall garden.

Make up your mind, after careful study, what crops will best suit your needs or the needs of your neighborhood and then plant only those crops. Aim to supply your own table just as long as it is possible to raise plants during the colder season. There will probably come a time later when it will be too cold to grow anything in the garden. Until that time comes make your garden work every minute of the day and night.

THE SOIL      **TAKE GOOD CARE OF YOUR GARDEN**

Much of the waste in gardening is due to lack of care after the garden has been successfully started. It is easy enough to plant a garden but it takes patience and continued care to grow a full crop. You ought not to waste anything, now that there is so much demand for food products. Every plant you have in your garden that is neglected and allowed to die is just so much loss to your country.

You should cultivate the soil shortly after each rain in order to break the dried crust and make a layer of dust on top to keep the ground moist underneath. Never work your soil when it is too wet. It should be dry enough to crumble in your hands before a garden plow or hand hoe is used.

Practice regular and thorough stirring of the soil throughout the season. Gardeners sometimes neglect this during dry times. Even if a layer of dust is already present your garden will be helped by regular cultivation. Cultivation, besides making a layer of dust on top, will:

1. Loosen and break up the ground into smaller pieces.
2. Increase the amount of food that the plants live on, and make it easier for them to get it.
3. Make it easier for the air to get to each piece of soil.
4. Mix the fertilizer better with the soil.
5. Destroy weeds and insects.

While your vegetables are small, cultivate close to the plants and as deeply as the plants are in the soil. As your vegetables grow larger, do not cultivate so deeply but farther from the row. You should cultivate at regular intervals until the plants have grown so large as to make it difficult to use a cultivator. In a small garden a hand hoe or weeder may then be used if more stirring seems necessary.

The wheel hoe is set up on wheels and has several different kinds of shovels. These may be changed for different kinds of work. The wheel hoe is used to cultivate between the rows. It is also used to get the garden ready to plant. It is one of the most useful garden tools. A spade is used to dig up the soil. If you use a garden line in your garden you can keep your rows straight, thus giving your garden a better appearance.

## HUMUS—THE FOOD PRODUCER

Humus is a little word of two syllables—hu-mus—that sounds a bit extraordinary. So did the word automobile 30 years ago. Yet humus is of vastly greater importance to America than are automobiles.

It is up to the teachers of America to make the word humus as common as the word automobile, and its meaning as well known by the man on the street.

Humus is the great basis of food production. The best way to Hooverize is to increase the humus in the soil. An ounce of humus will produce a pound of bread.

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 of swamps is also nearly pure humus in a late stage of decay.

The great trouble with most of our poor soils is that for them every day is a humusless day. 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't 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.

Let's get down to the real basis in this great business of food production. Let's teach the children of America that to save humus and put it to work is the first duty of the patriot. If food will win the war—humus will produce the food.

## MANURES

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.

## ROTATING YOUR GARDEN CROPS

When you grow certain crops on the same garden soil in such a way that they follow each other in regular order, it is called **CROP ROTATION**. A rotation in which you plant corn in your garden the first year, followed by potatoes the second year, and some crop of the clover family the third year, would be known as a three-year rotation. Many gardeners make the mistake of planting the same garden crop year after year in the same garden space and hence do not rotate their crops.

### ADVANTAGES OF ROTATION.

Experienced gardeners have found the following some of the advantages secured by rotating garden crops:

1. By planting potatoes in a new place in the garden you will get rid of the potato scab.
2. By planting cabbage in a new place club root is gotten rid of and there are not so many insect pests.
3. Different plants will be able to get their food from different soil depths. The potato, onion, and beet get their food from the first 6 inches of the soil. When these crops are followed by sweet corn, because of the longer roots of the corn plant, its food is gotten from a greater depth.
4. A greater variety of vegetables may be grown and your labor spread out over the year.
5. If you were to grow only one crop, the ground would be bare part of the year, but with a variety of crops you can have something growing for a longer part of the time.
6. Weeds that prove quite troublesome to some garden crops, like onions, may be gotten rid of by planting sweet corn in the same space and cultivating the soil more thoroughly.
7. In general, it is a good practice to find a new place occasionally for your whole garden if you have the room. If you do this, many plant diseases, as well as insects, will disappear.

## 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 out-door 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 degrees, 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.

## HOW TO MAKE YOUR COLDFRAME

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

A coldframe 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 coldframe, they are able to stand a good deal of cold without injury.

Coldframes should be made in the fall so that they will be ready for spring work. It is sometimes well to have two or three coldframes 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 coldframes 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 coldframe. 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 coldframe 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.

## 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 3 to 5 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 at 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.



## 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; others stick a pointed beak into the plant and suck up the sap. Some insects may be killed by putting arsenate of lead or other poison on the plant. Other 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 rather 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 chapter. 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.

*Remember that arsenate of lead is a deadly poison. It must never be left where young children may get it.*

**Write out a list of the insects you have seen that bite plants.**

## HOW TO USE ARSENATE OF LEAD

As you have learned in the last chapter, 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 in this strength:

Three level teaspoonfuls lead arsenate powder to one quart water, or

One ounce or about 10 level teaspoonsful lead arsenate powder to one gallon of water, or

One pound lead arsenate powder to 25 gallons of water.

3. If the paste form of lead arsenate is used instead of the powder, use twice as much lead arsenate in each case.

4. If you find it difficult to make the lead arsenate stick to the leaves, as you may when putting it on cabbage and asparagus, add resin fish oil soap at the rate of 1 ounce or a piece about 2 inches square to each gallon of water. Dissolve the soap in hot water before mixing with the lead arsenate water.

## ANOTHER ENEMY, 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 leaf, stem, or fruit. Then it sucks out the sap. Although these pests are so 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. As you learned in another chapter 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.

The best thing to use to kill aphids is the nicotine poison in tobacco, described in the last chapter.

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.

Do you remember what you learned about the use of kerosene wash or emulsion to kill these sucking insects?

ANOTHER ENEMY 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 uses to pierce the plant and suck out the sap.

**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.

## YOUR ENEMY THE CABBAGE WORMS

The cabbage worms are the worst enemies of cabbages and cauliflower. They are greenish caterpillars that may easily be found in the garden at almost any time. They eat the leaves of the growing plants, giving them a ragged appearance. As the cabbages head up they eat the inner leaves and often ruin the heads.

Like other insects, this cabbage worm has a life story which is worth telling:

Some fine morning a common white butterfly may come to your garden. She stops to lay an egg on the cabbage leaf and then flies away. A week later the egg hatches into a tiny green worm or caterpillar.

The little caterpillar nibbles at the green surface of the leaf, and begins to grow. It nibbles away for a week or so. Then it has eaten so much that it has become too large for the skin with which it was born. So it sheds this skin or molts and crawls out with a new skin which had been formed beneath the old one.

After the first molt the caterpillar feeds again upon the leaf, and keeps this up for several days before it is ready to molt the second time. Then it sheds its skin as before.

The caterpillar keeps on feeding and shedding its skin for about a month. Then it is full grown so far as this part of its life is concerned. It now crawls to the underside of a cabbage leaf or a stone, or board, and fastens itself by a mat of silken threads. Here it sheds its skin for the last time and becomes what is called a quiet chrysalis.

After another week the quiet chrysalis changes to a white butterfly like the one that laid the egg.

### HOW TO PROTECT YOUR CABBAGES.

The injuries of cabbage worms may be prevented in these ways:

1. Dusting the young cabbages with road dust, ashes, or something similar which prevent the laying of the eggs.
2. Catching and killing the butterflies that lay the eggs.
3. Dusting or spraying the young plants—*before they begin to head, never after*—with arsenate of lead.
4. Dusting or spraying the plants with hellebore, after they begin to head.
5. Pouring on hot water—at a temperature of 130° to 150° Fahrenheit.

## HOW TO USE KEROSENE WASH OR EMULSION

You remember that there are two kinds of insects that may attack your garden, those that bite the leaves and stems and those that suck the sap from the plants. You have learned about the biting insects and how to protect your plants from them. Now you are to learn how to prevent damage by the sucking insects.

The best things to use to kill aphids or plant lice and other insects that suck the sap from the green leaves and stems of crop plants are kerosene wash or emulsion and the nicotine extracts of tobacco.

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 surfaces 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 these 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 ten 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.

## SELLING YOUR VEGETABLES

### 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. It is a way to Hooverize many vegetables that you can't eat at once. Especially at this time, during the war, we must save and use every product possible, and we must not have any waste.

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 vegetables 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.

## 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 war duty, because, in so doing, you are making it possible for other vegetables to go to our soldier boys that would have been needed at home.

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 quicker 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.



## 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 markets 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. S. G. A. officers at central location in city, at school, or in the municipal market.

### THE MARKET.

### Preparation:

- (a) All produce should be in the best possible marketable state.
- (b) Produce should be graded according to size.
- (c) All produce should be clean, fresh, and crisp.
- (d) Produce should be graded according to quality.

### 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 various 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.

SELLING YOUR VEGETABLES  
TYPES OF MARKETING

**A SONG FOR THE SCHOOL GARDEN ARMY**

Composed by Master JOE LEE DAVIS,

Junior High School, Lexington, Ky.

Johnnie, get your hoe, get your hoe, get your hoe ;  
Mary, dig your row, dig your row, dig your row ;  
Down to business, girls and boys.  
Learn to know the farmer's joys,  
Uncle Sam's in need, pull the weed, plant the seed,  
While the sunbeams lurk do not shirk, get to work ;  
All the lads must spade the ground,  
All the girls must hustle round.

CHORUS.

Over there, over there ;  
Send the word, send the word over there,  
That the lads are hoeing, the lads are hoeing,  
The girls are sowing ev'rywhere,  
Each a garden to prepare ;  
Do your bit, so that we all can share  
With the boys, with the boys, the brave boys,  
Who will not come back 'till it's over, over there.

## A PAGE FOR THE TEACHER

The preceding pages are intended largely for instruction to pupils; those that follow are intended to carry various suggestions to teachers in their relations to pupils.

The United States School Garden Army was organized in March, 1918, and many leaflets were sent out to teachers and supervisors during the succeeding months. The insignia, or service badges, were furnished to more than a million children and many thousands of service flags, Pied Piper posters, and record books were distributed.

Thanks to the appropriation that President Wilson has allotted for continuing the work, the United States School Garden Army is prepared to furnish during the school year of 1918-19 the following:

The Fall Manual of the United States School Garden Army;  
The Spring Manual of the United States School Garden Army;

Insignia or service badges for officers and privates;

Service flags for Garden Army Soldiers;

Pied Piper posters;

Regional leaflets for supervisors and teachers.

These will be sent free to all schools working under United States School Garden Army organization.

Heretofore, gardening, so far as it has been touched by the schools, has been largely a matter of sporadic impulse for a few weeks in spring. The present world crisis shows the necessity of a much more serious and continuous interest throughout the year. The letters on the preliminary pages of this Manual show the opinions of President Wilson and other leaders as to the importance of gardening in the schools. It has become the privilege of every teacher to serve humanity by leading her pupils to sympathetic consideration of garden problems to the end that they may become intelligent producers of food and beauty, not alone during these years of their youth but also throughout their lives.

This Manual will be supplemented by various leaflets for each of the five regions. These leaflets will be sent free to any teacher on application.

The various garden subjects treated should be used for classroom exercises as well as for outdoor projects. The teacher will readily see where these topics may be correlated with other school work. Elaboration of the suggested lessons is not only permissible but is to be encouraged as much as possible.

## 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. Let them see pictures of the National Capitol and of the Congressional Office Buildings.

This suggestion is important and should be followed early in the school year.

## 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 companies of the United States School Garden 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 enlistment: The signing of the 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 enlistment sheets will be furnished by this bureau. The enlistment sheets are to be retained by the garden teacher or supervisor, or filed with the superintendent of schools. The disposition of the record books is left with the garden teacher or garden supervisor. They are not to be sent to this bureau.

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

Officers: Each company to have a captain and two lieutenants.

Insignia: For the privates, a bronze service bar with U. S. S. G. on it. For second lieutenant the same bar with one star in the border. For first lieutenant the same bar with two stars in the border. For the captain the same bar with three stars in the border. These insignia will be furnished by us upon request stating the number of enlisted garden soldiers.

Enlistment 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 in gardening now being carried on and to make it a permanent part of the course of study in all the schools of America.

## 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

## STORIES OF BEANS AND OTHER THINGS

The garden operations of the pupils make an excellent basis for language stories. Such stories embody real first-hand knowledge. In telling them the pupils feel the interest of a personal experience.

One advantage in developing such stories is that they can readily be adapted to the different grades. The length of the story depends chiefly upon the number of details mentioned. In the lower grades where the stories are made up of few sentences, only the principal facts are mentioned. In the upper grades details of development and structure are readily included.

The following model stories are suggestive of the work that may be expected of pupils in the third grade:

### MY BEAN SEEDS.

Yesterday I planted half a pint of bean seeds in my home garden. I put down a line to keep the row straight. I made a furrow along the line with a hoe. I dropped bean seeds in the bottom of the furrow, one seed every two inches. I covered the seeds two inches deep. I hope they will come up soon.

### MY BEAN PLANTS.

Early last week I planted some bean seeds in my home garden. This morning I saw them coming up. The stem is curved over at first. It pulls up the two thick seed leaves. Then the stem becomes straight and the large leaves begin to grow. I hope they will grow rapidly.

Such stories may be oral or written or both. They help to make the language lessons real.

## USING THE SEED CATALOGUES

The seed catalogues are excellent textbooks on school gardening. They are always up to date. They have attractive pictures. They give prices of seeds in packets or in bulk. They describe the best varieties. Many of them give directions for planting.

These seed catalogues appeal strongly to pupils. Boys and girls know that they are the real thing. They see their value and soon learn how to use them.

Here is a little plan for getting and using these catalogues:

1. Tell the pupils to look in the advertising columns of the magazines for the names and addresses of seed houses that offer their catalogues free to those who apply.

2. Make a blackboard list of all the firms reported. Get a list of at least six or eight such firms.

3. Divide these firms among the pupils so that only a few will send to each firm.

4. Have a lesson on the form of the application, allowing each pupil to make the request in his own way, provided it is in clear and simple English, with proper courtesy. Let the lesson end when the request is written on a post card or as a letter ready for mailing. Find stamps some way and see that the requests are mailed.

5. When the catalogues come, have each pupil keep his own in his desk. Use these in connection with every crop which is planted. Let pupils look up lists of varieties and compare prices and descriptions. Many pupils will be able to bring recent seed catalogues from home. Let these be brought in such cases rather than to send for new ones.

**A live teacher can make these seed catalogues one of the liveliest features of a live school.**

