

UNITED STATES SCHOOL GARDEN ARMY
DEPARTMENT OF THE INTERIOR

U · S · S · G

BUREAU OF EDUCATION
WASHINGTON



HOME GARDENING FOR CITY CHILDREN OF THE
FIFTH, SIXTH, AND SEVENTH GRADES

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FOLLOW THE PIED PIPER
Join the United States
School Garden Army.



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LETTER OF THE COMMISSIONER OF EDUCATION.

TO PARENTS:

To all parents who see this bulletin I wish to say a word about the very great value of the school-directed home gardening which is advocated by the Bureau of Education and to assist in which these lessons and directions have been prepared.

I know of nothing which can be made more valuable for children in cities, towns, and industrial villages than this form of gardening. It is valuable for physical development, for the formation of moral habits, for the development of the power of observation, of careful thinking, and of practical application. It also has considerable economic value.

While children under 14 or 15 should not have hard or difficult tasks imposed upon them, requiring constant effort under adverse conditions, it is nevertheless true that for them to work outdoors, with their feet in the soil, their heads in the sunshine, and their lungs filled with good fresh air is good for them. It is good for them to work until they are so tired and hungry that they will eat heartily and sleep soundly. It develops muscle, establishes the strength of vital organs, and contributes to length of life and to joyous living.

All children like to know, or at least to believe, that they are doing useful work and contributing toward their support. For them to do so helps to establish the fundamental moral principle that every person should pay his own way by some form of useful work rather than consenting to live at the expense of others.

City children do not ordinarily have so good opportunity to gain first-hand knowledge of nature as country children do. This form of gardening brings them into close contact with the soil, makes them observe the changes of the weather, gives them a knowledge of growing plants, and teaches as nothing else can the relation of cause and effect. The fact that they must wait through weeks and possibly months for the growth and maturity of crops teaches a certain kind of patience which is very valuable and which can not be learned so well in any other way.

This year the 2,000,000 children in the United States School Garden Army are producing approximately \$50,000,000 worth of vegetables and small fruits—food products to be consumed where produced, without loss in handling or cost of transportation. Many children in North Carolina and Virginia have produced more than \$50 worth—some have produced as much as \$100 worth. In several cities the average, last year, was more than \$50 for each child.

It is to be hoped that very soon this form of gardening will become established as an essential part of the public school work and of the education of all city children. May I ask your cooperation in bringing this about?

Yours, sincerely,

P. P. CLAXTON, *Commissioner.*

JUNE 26, 1919.

HOME GARDENING FOR CITY CHILDREN IN THE FIFTH, SIXTH, AND SEVENTH GRADES.

The writer wishes to make the following acknowledgments for valuable help in the preparation of these courses: Evelina O. Wiggins, teacher in high school, Lynchburg, Va.; Lucy Davis, supervisor of primary and grammar grades, Lynchburg, Va.; Jessie Peters, departmental grammar grade teacher, Lynchburg, Va.; Mary Morris, supervisor of gardening, Goldsboro, N. C.; Gertrude Wright, supervisor of gardening, Chattanooga, Tenn.; L. W. Purdum, truck grower, Danville, Va.; S. M. Kevan, manager of outside work in Erlanger Cotton Mill Village, Lexington, N. C.; T. C. Johnson, director of the truck experiment station, Norfolk, Va.; Nettie Wynn, teacher in grammar grades, Danville, Va.; L. B. Fitts, supervisor of gardening, Schoolfield, Va.; Margaret McCreight, supervisor of gardening, Knoxville, Tenn.; and the grammar grade teachers in Lynchburg, Schoolfield, and Danville, Va., and in Greensboro, High Point, Thomasville, Concord, Durham, Goldsboro, and Kinston, N. C.

TO SUPERINTENDENTS, PRINCIPALS, AND TEACHERS:

The following courses are the outcome of three years' work in both the teaching of gardening in the classroom and the directing of gardening in the homes. The fourth, fifth, sixth, and seventh grade teachers and their supervisors in Lynchburg, Danville, and Schoolfield, Va.; Greensboro, Winston-Salem, Durham, Raleigh, Goldsboro, High Point, Concord, and Asheville, N. C.; and Chattanooga and Morristown, Tenn., have worked directly under the supervision of the United States Bureau of Education, and as a result of their work these courses have been evolved. The purpose of these courses is to make the children familiar with all the garden activities used in the planting of an ordinary city home lot. The classroom lessons are planned so that they will precede the home-garden activities. An effort has continually been made to teach the children in the classroom the factors that prevented successful gardening in the homes. If this plan is continued, the courses will necessarily change from year to year. Most of the projects outlined in these courses have been successfully carried out by some child in one of the above-mentioned cities, and, in fact, there are children who are now carrying out successfully all of the projects outlined for their grade.

Experience has shown that children can be taught to become good gardeners. To accomplish this, however, gardening should become a regular part of the school work, with at least three lessons each week throughout the school year, and the home gardens should be directed by supervising teachers who visit the gardens regularly. Garden problems are too large for children to solve without assistance.

TO THE GARDENERS:

The success of the garden depends chiefly upon how conscientiously the gardener works. Gardening is a real industry, involving many forces, and demanding intelligent management and persistent labor. The old maxim, "Don't delay until to-morrow what should be done to-day," needs to be continually practiced.

Forces that control the success of the garden are as follows:

1. *Location.*—The vegetable garden should be located where the plants will receive sufficient sunlight and air.
2. *Soil.*—The soil should be deep, rich, mellow, and well drained.

3. *Seed*.—Only the best vegetable seed, purchased from reliable seedsmen, should be planted.
4. *Plants*.—All vegetable plants, such as cabbage, lettuce, tomatoes, pepper, egg plant, and celery, etc., should be grown, not purchased.
5. *Fertilizer*.—Make three light applications of commercial fertilizer at intervals during the growing season rather than one heavy application of the entire amount.
6. *Cultivation*.—The soil between the rows should be kept well hoed. The garden should be free of weeds.
7. *Insect enemies and plant diseases*.—The garden plants should be protected from their insect enemies and plant diseases.
8. *Intensive gardening*.—Use every square foot of garden space. As soon as one crop is harvested, plant another. A well-managed garden is never "laid by."



The raising of vegetables teaches the child how to contribute to the family support, and is a healthful occupation.

9. *Harvesting*.—Allow no vegetable to go to waste. Can, dry, or sell what can not be used fresh by the family.
10. *Seasons*.—Practice all-year-round gardening.
11. *Records*.—Accurate records of expenditures and receipts should be kept, as well as the dates of planting and of harvesting each crop.

PROJECTS FOR THE FIFTH GRADE.

In order to receive credit for the fifth-grade course in gardening, 10 projects must be completed to the satisfaction of both the garden teacher and the garden supervisor. Projects III, VII, X, XV, and XVI are required. The gardener may select any five of the remaining projects.

Project I. Grow at least 20 heads of winter cabbage. (See The winter cabbage crop.)

1. What is the best variety of cabbage for the winter crop?
2. How are the plants grown? When should they be ready for transplanting into the garden?
3. How should the soil be prepared for these vegetables?
4. How are they planted in the garden?
5. What care do they need during the winter months?
6. What care do they need during the spring months?
 - (1) *Domestic science, 20 per cent.*—Food value, cooking, making salads.
 - (2) *Gardening, 80 per cent.*—Growing the crop.

Project II. Prepare the soil for a winter garden at least 20 feet by 20 feet. (See Fall and winter gardens; Preparation of the garden for planting; Organic matter for the home gardens.)

1. How is the soil made mellow and deep?
2. How is it made warm enough for the winter growing of vegetables?

Manual training, 20 per cent.—Marking off the garden, marking off the drains, laying off the beds, laying off the rows.

Gardening, 80 per cent.—Preparation of the soil.

Project III. Grow a winter garden at least 20 by 20 feet of at least 3 vegetables. (See Late fall and winter gardens; Planting calendar; Planting chart; Schedule.)

1. What vegetables grow well during the winter months?
2. How are these vegetables planted?
3. What care do they need during the winter months?

Gardening, 100 per cent.—Growing the crops.

Project IV. Make a compost heap at least 5 by 5 feet and 3 feet high. (See Organic matter for the home garden.)

1. Of what is a compost heap made?
2. How is it constructed?
3. Where should it be erected?
4. What care needs to be given it during the winter?
5. Why should every garden have a compost heap?
6. Tell how it would be possible for cities to make compost heaps. What use could be made of the organic matter?

Gardening, 100 per cent.—Making the compost heap.

Project V. Make a hotbed for spring vegetable plants. (See Raising vegetable plants.)

1. Where should the hotbed be located? Why?
2. How is a hotbed made?
3. When should the pit be filled? Why?

Manual training, 50 per cent.—Making frame.

Gardening, 50 per cent.—Making and filling pit.

Project VI. Plan and chart a home garden to include enough Irish potatoes, snap beans, butter beans, corn, tomatoes, beets, okra, salad, field peas, pepper to supply your family. (See The garden plan; Seeds for the garden; Planting calendar; Planting chart; Planting schedule.)

1. How should the vegetables be grouped?
2. Estimate the quantity of the vegetables needed to supply family.
3. Estimate the total length of rows necessary.
4. Estimate the quantity of each kind of seed required.
5. What are the best varieties to purchase?
6. What is the earliest date these vegetables can be planted in the garden?
7. How are these vegetables planted?

Arithmetic, 75 per cent.—The mathematical part of project.

Gardening, 25 per cent.—The gardening part of the project.

Project VII. Raise at least 20 tomato plants that are at least 6 inches tall, stocky, and dark green. The plants should be ready to put into the garden as soon as the soil is warm and all danger of frost is over. The last transplanting must be from individual pots. (See Raising of vegetable plants; Schedule.)

1. What varieties, if selected, would provide the family with tomatoes from July to November?
2. How are the plants grown?
3. Why should every gardener grow his own plants?

Manual training, 30 per cent.—Making flats, hotbed, cold frame, shade protectors.

Gardening, 70 per cent.—Growing the plants.

Project VIII. Make a flower border at least 16 feet long and 4 feet wide, to contain at least 5 different kinds of flowers. (See Flower growing.)

1. Where should the border be located?
2. How should the soil be prepared?
3. What selection of flowers would furnish blooms all summer and fall?
4. How would you place the flowers in the border?
5. How are the plants grown?

Art, 50 per cent.—Grouping flowers artistically in border. Arranging flowers artistically in vases.

Gardening, 50 per cent.—Making the flower border.

Project IX. Prepare the soil for a garden at least 20 feet by 20 feet. (See Preparation of the garden for planting; Organic matter for the home garden.)

1. What is a good garden soil?
 2. What needs to be done to change your garden soil into a good vegetable producing soil?
- Manual training, 20 per cent.—Laying off the garden, drains, rows.*
Gardening, 80 per cent.—Preparation of the soil.

Project X. Grow a spring garden at least 20 by 20 feet of at least 3 vegetables, not including Irish potatoes. (See Planting calendar; Planting chart; Schedule; Seeds for the garden; Care of growing vegetables; Insect chart; Insect control; Protecting the garden from the early fall frosts.)

1. How are the crops planted?
2. What are the best varieties to select?
3. Where can these seeds be purchased?
4. What care will the growing crop require?

Manual training, 20 per cent.—Laying off the garden, drains, rows, making trellises, making frames to protect vegetables from late spring frosts.

Gardening, 80 per cent.—Growing the crops.

Project XI. Raise Irish potatoes from at least 10 seed potatoes. (See Planting Irish potatoes.)

1. What are the best varieties?
2. When should the potato crops be planted?
3. What potatoes should be selected for seed?
4. How should they be cut?
5. How should the soil be prepared?
6. What attention should be given to the growing crop?
7. When should the crops be ready to harvest?
8. How are potatoes stored?

Domestic science, 20 per cent.—Food value of potatoes, ways of cooking potatoes, salads.

Gardening, 80 per cent.—Growing the crop.

Project XII. Keep a garden at least 20 by 20 feet free from weeds, well hoed, and fertilized from March to October. (See Care of growing vegetables.)

1. Why should a garden be kept well hoed?
2. How often should a garden be hoed?
3. How deep should it be hoed?
4. What are the most troublesome weeds in the garden?
5. How are they controlled?
6. How often should growing vegetables receive a light dressing of commercial fertilizer?
7. When is the best time to apply this fertilizer?
8. How should it be applied?

Gardening, 100 per cent.—Keeping the garden weeded and hoed.

Project XIII. Grow tomatoes from at least 24 plants. The plants must be grown by the gardener. Each plant must produce 30 cents' worth of tomatoes. (See Growing of tomatoes.)

1. How deep should the plants be set? Why?
2. What should be the distance apart of the rows? Of the plants?
3. How are they staked? When?
4. How are they pruned? When?
5. What provision could be made for watering the plants?

6. Would it be better to hoe or mulch the crop?
7. What care should be given the growing crop?
8. How are tomatoes prepared for marketing?

Manual training, 10 per cent.—Making trellises.

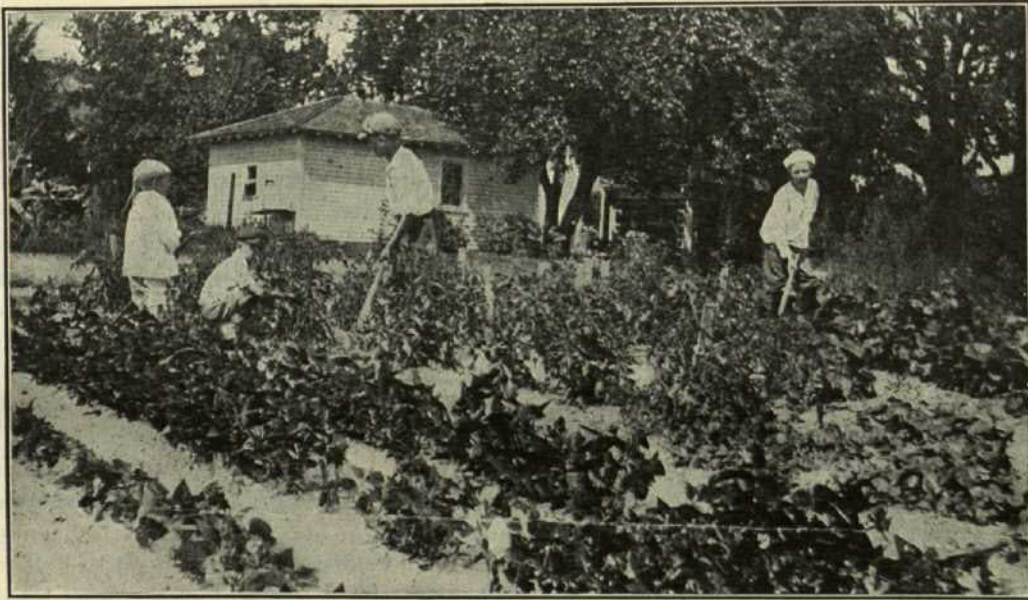
Domestic science, 10 per cent.—Food value of tomatoes. Cooking tomatoes, tomato salads.

Gardening, 80 per cent.—Growing crop.

Project XIV. Protect the vegetables from their insect enemies. (See Insect chart; Insect control.)

1. In what ways do insects injure vegetable plants?
2. What are the most troublesome insects in the garden?
3. How are they controlled?

Gardening, 100 per cent.—Spraying the vegetables.



Both the educational and cultural values should be brought out in the teaching of gardening.

Project XV. Grow a summer garden to contain enough of at least 3 vegetables to supply the family. (See Preparation of the garden for planting; Planting calendar; Planting chart; Schedule; Care of growing crops; Insect chart; Insect control; Protecting the summer garden from early fall frosts.)

1. What factors should be considered in selecting these vegetables?
2. What are the best varieties to plant?
3. How are they planted?
4. How should the soil be prepared?
5. What care will the growing crops require?
6. How can the late summer garden be protected from the early fall frosts?

Manual training, 20 per cent.—Laying off the drains, rows, making frames to protect vegetables from early fall frosts.

Gardening, 80 per cent.—Growing the crops.

Project XVI. Grow a fall garden at least 20 by 20 feet of at least 3 vegetables. (See Preparation of the garden for planting; Planting calendar; Planting chart; Schedule; Organic matter for the home garden; Care of growing vegetables; Insect chart; Insect control.

1. What vegetables should be selected?
2. When should the vegetables be planted?
3. How are they planted?
4. How is the soil prepared?
5. What care should be given the growing crops?

Manual training, 10 per cent.—Laying off the rows, drains.

Gardening, 90 per cent.—Growing the crops.

Project XVII. Can at least 12 quarts of tomatoes. (See Steps in canning.)

1. What causes canned tomatoes to spoil?
2. How can tomatoes be canned successfully?

Domestic science, 100 per cent.—Canning tomatoes.

PROJECTS FOR THE SIXTH GRADE.

In order to receive credit for the sixth-grade course in gardening 10 projects must be completed to the satisfaction of both the garden teacher and the garden supervisor. Projects IV, VII, XII, XIV, and XV are required. The gardener may choose any 5 of the remaining projects.

Project I. Raise at least 24 heads of lettuce or at least 12 heads of cabbage for the November market. (See Growing head lettuce; Planting calendar; Planting chart; Schedule; Raising vegetable plants; Care of growing vegetables; Insect chart; Insect control.)

1. What are the best varieties of lettuce to grow for the November market? Of cabbage?
2. When are the plants needed?
3. How are they raised?
4. How are the plants transplanted into the garden?
5. What care should be given the growing crop?

Domestic science, 20 per cent.—Food value of lettuce and cabbage, cooking cabbage, salads of lettuce, salads of cabbage.

Gardening, 80 per cent.—Growing the crops.

Project II. Root 25 cuttings of roses. (See Flower growing.)

1. What wood is selected?
2. How is the cutting made?
3. How is it rooted?

Manual training, 30 per cent.—Making the frame.

Gardening, 70 per cent.—Making and rooting the cuttings.

Project III. Clean up a section of the garden at least 25 by 25 feet. (See Fall cleaning up of the garden.)

1. What should be done with the rubbish?
2. Why should the garden be tidied up in the fall rather than wait until spring?

Manual training, 10 per cent.—Making frame to inclose compost heap.

Gardening, 90 per cent.—Cleaning up of the garden.

Project IV. Grow a winter garden at least 25 by 25 feet of at least 4 vegetables. (See Late fall and winter gardens; Planting calendar; Planting chart; Schedule; The winter cabbage crop.)

1. What are the most profitable vegetables to select?
2. How should the soil be prepared?
3. How are these vegetables planted?
4. What care should be given the growing crops?

Gardening, 100 per cent.—Growing the crops.

Project V. Grow a green manuring crop in a section of the garden at least 25 by 25 feet. (See Organic matter for the home garden.)

1. How should the soil be prepared?
2. What crop could be grown?
3. How much seed would be needed?
4. How is the selected crop planted?
5. When should it be turned under? Why?
6. How will a green manuring crop help the garden?

Gardening, 100 per cent.—Growing the crop.

Project VI. Plan and chart the home garden to include the first and second plantings. (See The garden plan; Seeds for the garden; Planting calendar; Planting chart; Schedule.)

1. How should the vegetables be grouped?
2. Estimate the quantity of vegetables needed to supply the family.
3. Estimate the total length of rows necessary.
4. Estimate the quantity of seed required.
5. What are the best varieties to purchase?
6. What is the earliest date these vegetables can be planted in the garden?
7. How are these vegetables planted?
8. What should be the money return? Consult last year's market prices.

Arithmetic, 75 per cent.—The mathematical part of project.

Gardening, 25 per cent.—The gardening part of project.

Project VII. Raise at least 50 tomato plants and 100 lettuce plants, also 25 pepper plants or 25 cucumber plants. (See Raising of vegetable plants.)

1. Why should gardeners grow their own vegetable plants?
2. What is the best variety of each of these vegetables to be grown?
3. When should the plants be ready to put into the garden?
4. When, where, and how should the seed be sown?
5. How are the plants grown?
6. What is the market value of first-class tomato plants?

Manual training, 30 per cent.—Making flats, hotbed, cold frame, and shade protector.

Gardening, 70 per cent.—Growing the plants.

Project VIII. Make a flower border at least 16 feet long and 4 feet wide to contain at least 6 different kinds of flowers. Snap dragon and single dahlia are to be two of the flowers chosen. The border is to always have some flower in bloom. (See Flower growing.)

1. Where should the border be located?
2. How is the soil prepared?
3. How are the plants grown?
4. How should they be planted in the border?

Art, 50 per cent.—Grouping flowers artistically in border, arranging flowers artistically in vases.

Gardening, 50 per cent.—Making the flower border.

Project IX. Grow a strawberry bed of 40 plants. (See The strawberry bed.)

1. What are the best varieties to grow?
2. Where can the plants be secured?
3. How is the bed prepared?
4. How are the plants set out?
5. What care will the plants require?
6. When can the fruit be harvested?

7. What yield may be expected?

8. How long will the bed be productive?

Domestic science, 20 per cent.—Canning strawberries; food value.

Gardening, 80 per cent.—Raising strawberries.

Project X. Prepare the soil for a garden at least 25 by 25 feet. (See Preparation of the garden for planting; Organic matter for the home garden.)

1. When is a garden soil well prepared?

2. What is needed to be done to put your garden soil in this condition?

Manual training, 20 per cent.—Laying off the garden, drains, rows.

Gardening, 80 per cent.—Preparation of the soil.

Project XI. Grow 50 heads of lettuce for the May market. (See Growing head lettuce.)

1. What is the market price of head lettuce in May?

2. What is the best variety for the May market?

3. When, where, and how should the seed be sown?

4. When and how should the plants be transplanted into the garden?

5. What care must be given to the growing crop?

Domestic science, 20 per cent.—Food value of lettuce, making salad.

Gardening, 80 per cent.—Growing the crop.

Project XII. Grow a spring garden at least 25 by 25 feet of at least 5 vegetables, and a summer and fall garden of at least 5 vegetables each. (See Planting calendar; Planting chart; Schedule; Seeds for the garden; Care of growing crops; Insect chart; Insect control; Protecting the garden from the early fall frosts; Marketing the surplus.)

1. What vegetables should be selected? Why?

2. When are these vegetables planted?

3. What is the best variety of each?

4. Where can these seeds be secured?

5. How are these seeds planted?

6. What care will the growing crop require?

7. How can the vegetable plants be protected from the early frosts?

8. What can be done with the surplus?

Manual training, 20 per cent.—Laying off the garden, drains, rows; making trellises; making frames to protect vegetables from frost.

Gardening, 80 per cent.—Growing the crops.

Project XIII. Keep the garden well hoed, free of weeds, and fertilized from March to October. (See Care of growing vegetables.)

1. When should the garden be hoed?

2. When is the garden well hoed?

3. What is the best time to pull weeds?

4. How is the grass controlled?

5. When and how should commercial fertilizer be applied?

6. What is the best kind to use for the growing of vegetable crops.

Gardening, 100 per cent.—Keeping the garden weeded and hoed.

Project XIV. Supply the family with beans from June to November. (See Growing of beans.)

1. What varieties, if planted, will keep the family supplied with snap beans from May to November? With butter beans?

2. When should shell beans be planted?

3. What supports can be used for running varieties of beans?

4. How are beans planted?
5. How are beans canned? Dried?

Manual training, 10 per cent.—Making of trellises, driers.

Domestic science, 15 per cent.—Food value of beans, canning, drying, storing.

Gardening, 75 per cent.—Raise at least three different kinds of beans.

Project XV. Supply the family with tomatoes from June to November. You must grow your own plants. (See Growing tomatoes.)

1. What varieties, if selected, will provide the family with tomatoes from June to November?
2. How are the plants grown?
3. How are the plants transplanted into the garden?
4. How is the soil prepared?
5. What is the best method of staking? Why?
6. How and when should they be pruned?
7. What provision should be made for watering?

8. What care will the growing crop require?

9. How are tomatoes canned?

Manual training, 10 per cent.—Making trellises.

Domestic science, 20 per cent.—Food value of tomatoes, canning, cooking, salads.

Gardening, 70 per cent.—Growing the crop.

Project XVI. Protect the vegetable plants from their insect enemies. (See Insect chart; Insect control.)

1. What crops are injured by insects?
2. How can you tell a biting insect from a sucking insect?
3. What spray should be used for biting insects? For sucking insects?
4. How are these sprays made?
5. How are they applied?

Gardening, 100 per cent.—Controlling the garden insects.

Project XVII. Can at least 4 quarts of tomatoes and at least 4 pints of snaps. (See Steps in canning.)

1. How are tomatoes canned?
2. How are beans canned?

Domestic science, 100 per cent.—Canning the tomatoes and beans.

Project XVIII. Market at least 2 dozen tomatoes and 2 gallons of beans. (See Marketing the surplus.)

1. How are tomatoes graded for market?
2. How are beans graded for market?
3. What governs the price the tomatoes will bring? That the beans will bring?

Gardening, 100 per cent.—Marketing the vegetables.



To teach gardening efficiently in the classroom the teacher should have a garden of her own.

Project XIX. Raise at least 40 plants, each of 5 different kinds of perennial flowers.
(See Flower growing.)

1. Where can the selected seed be purchased?
2. When and where should each variety be planted?
3. How are the plants grown?
4. When should they be placed in the flower border?
5. When will they bloom.

Manual training, 30 per cent.—Making frame for seed bed. Making cold frame.
Gardening, 70 per cent.—Growing the plants.

PROJECTS FOR THE SEVENTH GRADE.

In order to receive credit for the seventh-grade course in gardening 10 projects must be completed to the satisfaction of both the garden teacher and the garden supervisor. Projects I, XIV, and XV, are required. The gardener may select any seven of the remaining projects.

Project I. Grow a winter garden at least 30 by 30 feet of at least 5 vegetables. (See Fall and winter gardens; The winter cabbage crop; Planting calendar; Planting chart; Schedule; Preparation of the garden for planting; Organic matter for the home gardening; Fall cleaning up of the garden.)

1. How should the preparation of the soil for a winter garden differ from that of a summer garden? What is the controlling factor in the success of a winter garden?
2. What vegetables can be grown in a winter garden?
3. How are these vegetables planted?
4. What care will the growing crop require?
5. What yield may be expected?
6. What would a winter garden cost? What would be the money returns?
7. What should be done with the section of the garden that is not used for the growing of vegetables?
8. What should be done with the refuse of the summer garden?

Gardening, 100 per cent.—Growing the crops.

Project II. Store at least 1 bushel of root vegetables or 100 bunches of celery or 50 heads of cabbage. (See Storing of vegetables.)

1. How are the pits made for root vegetables? What vegetables should be selected?
2. How is celery banked? What precautions must be taken?
3. How is cabbage stored?

Gardening, 100 per cent.—Storing the vegetables.

Project III. Grow 12 heads of lettuce for January market. (See Growing head lettuce.)

1. How are cold frames made?
2. Where should they be placed?
3. What variety of lettuce grows well in cold frames?
4. How are the plants transplanted into the cold frame?
5. What care will the growing crop require?
6. What additional protection will be needed during cold days and nights?

Manual training, 20 per cent.—Construction of cold frame.

Domestic science, 10 per cent.—Food value of lettuce; salads.

Gardening, 70 per cent.—Growing the crop.

Project IV. Raise at least 1,000 blooms of sweet peas for the market at commencement time.
(See Growing sweet peas.)

1. What is the best variety to plant?
2. Where can the seed be secured?

3. How is the soil prepared?
4. How are the seed planted?
5. What care will the growing crop require?
6. What can be used for the trellis?

Manual training, 10 per cent.—Putting up the trellis.

Art, 10 per cent.—Arranging flowers artistically in vases.

Gardening, 80 per cent.—Growing the flowers.

Project V. Make a hardy flower border at least 16 feet long and 4 feet wide to contain at least 5 different kinds of flowers. (See Flower growing.)

1. Where should the border be placed?
2. What should govern the selection of flowers?
3. How should the soil be prepared?
4. How are the flowers planted in the border?
5. What care will the border require?
6. What can be done to insure a longer picking period?

Art, 50 per cent.—Grouping flowers artistically in border. Arranging flowers artistically in vases.

Gardening, 50 per cent.—Growing the flowers.

Project VI. Root 25 cuttings of grapes.—(See Flower growing.)

1. What varieties should be selected?
2. From what wood are the cuttings made?
3. How are cuttings made?
4. How are they rooted?

Gardening, 100 per cent.—Rooting the cuttings.

Project VII. Root at least 10 cuttings of at least three different kinds of shrubs. (See Flower growing.)

1. What shrubs grow well about a home? What vines?
2. How are cuttings made?
3. How are they rooted?

Gardening, 100 per cent.—Rooting cuttings.

Project VIII. Transplant 12 bush fruits into the garden. (See Growing of raspberries, blackberries, and dewberries.)

1. What bush fruits can be grown?
2. Where can the plants be secured?
3. What are the soil requirements of bush fruits?
4. Where should they be placed in the garden?
5. How are they planted?
6. What care will the plants require?
7. When will they start to bear fruit?
8. How long will they produce fruit?

Domestic science, 20 per cent.—Canning berries, food value.

Gardening, 80 per cent.—Growing berries.

Project IX. Prune two mature trees. (See Pruning of flowering shrubs, vines, and mature trees.)

1. What makes a tree beautiful?
2. What branches are pruned from a shade tree?
3. How are these branches cut off?
4. What care should be given the wound?
5. How are cavities in trees filled?

Gardening, 100 per cent.—Pruning the trees.

Project X. Prune six flowering shrubs and two vines. (See Pruning of flowering shrubs, vines, and mature trees.)

1. What governs the time to prune shrubs and vines?
2. How are they pruned?

Gardening, 100 per cent.—Pruning the vines.

Project XI. Plan and chart the home front yard to include the placing and varieties of shrubs and trees; also indicate where walks and drives are to be made. (See Planning and planting front yards.)

1. Where should shrubs, vines, and trees be placed in the front yard?
2. What shrubs, vines, and trees can be used?
3. Where are the walks and drives placed?

Art, 50 per cent.—Grouping vines, shrubs, trees, in a front yard.

Gardening, 50 per cent.—Care of front yards.

Project XII. Make and care for a lawn, or manage the home lawn from February to November. (See The lawn.)

1. What grasses are used for lawns?
2. Where can the seed be secured?
3. How much seed will be required?
4. How should the soil be prepared?
5. What care will the lawn require?

Gardening, 100 per cent.—Taking care of the lawn.

Project XIII. Plan and chart a 12 months' garden for your family. (See The garden plan; Seed for the garden; Planting calendar; Planting chart; Schedule.)

1. What vegetables would you select to give a continuous supply of fresh garden produce throughout the year?
2. How should the vegetables be grouped in the garden?
3. What quantity of each vegetable will be needed?
4. What will be the total length of rows needed?
5. What quantity of each kind of seed will be required?
6. What is the best variety for each planting?
7. How are these vegetables planted?

Arithmetic, 75 per cent.—The mathematical part of the project.

Gardening, 25 per cent.—The gardening part of the project.

Project XIV. Raise at least 200 garden plants. Make selections from at least three of the following groups. (See Raising of vegetable plants; Growing sweet potatoes.)

(a) Lettuce, cabbage.

(b) Tomatoes, peppers, egg plant, cucumbers, melons.

(c) Sweet potatoes.

(d) Asparagus, celery, onions.

1. What seeds should be planted in flats? How are flats prepared? How are they planted? What care will the plants require?
2. What seeds should be planted in hotbeds? How are hotbeds prepared? How are they planted? What care will the plants require?
3. What seeds should be planted in seed beds? How are seed beds prepared? How are they planted? What care will the plants require?
4. What plants should be potted?
5. How are the pots filled?
6. Where are they placed?

7. What care will the potted plants require?

8. How are sweet potato beds made? How planted? What potatoes should be selected for seed?

Manual training, 50 per cent.—Making flats, hotbed, cold frame, and shade protectors.

Gardening, 50 per cent.—Raising the plants.

Project XV. Grow a spring garden at least 30 by 30 feet of at least 5 different vegetables, a summer garden same size of at least 6 vegetables, and a fall garden same size of at least 6 vegetables. (See Planting calendar; Planting chart; Schedule; Seed for the garden; Care of growing crops; Insect chart; Insect control; Protecting the garden from the early fall frosts.)

1. How should the soil be prepared?

2. What should govern the selection of the vegetables?

3. Where should they be placed in the garden?

4. How should they be planted?

5. What care will the growing crops require?

6. How can the summer garden be protected from the early fall frosts?

Manual training, 20 per cent.—Laying off the garden, drains, rows. Making trellises, making frames to protect vegetables from frosts.

Gardening, 80 per cent.—Growing the crops.

Project XVI. Market 2 gallons of snap beans or 1 peck of tomatoes, can 4 pints of snap beans or 4 pints of soup mixture, can 4 quarts of tomatoes. (See Marketing the surplus; Steps in canning.)

1. How should the vegetables be graded for the market?

2. How are they packed?

3. How is corn dried? Butter beans?

4. What organisms cause canned snap beans to spoil?

5. Where are these organisms found?

6. How are snaps canned?

7. How are tomatoes canned?

8. Why must beans be cooked longer than tomatoes?

Domestic science, 70 per cent.—Canning tomatoes, beans, soup mixture, drying corn, butter beans.

Gardening, 30 per cent.—Marketing tomatoes, snaps.



The surplus garden space should be used to grow crops for the market.

PREPARATION OF THE GARDEN FOR PLANTING.

Fifth grade, Projects II, IX, XI, XIII, XV, XVI.

Sixth grade, Projects IV, V, IX, X, XV.

Seventh grade, Projects I, XV.

Preparation of the garden for the planting of crops means five things: Cleaning, fencing, draining, tilling, and adding materials.

Cleaning.—In order that all available space may be utilized for the growing of crops and that the sun and air may warm the soil, the garden should be completely rid of all rubbish. (See Fall cleaning up of the garden.)

Fencing.—A fence made of chicken wire allows a maximum amount of light and a free circulation of air, both of which are desirable for the best development of the plants and the

prevention of such diseases as mildew. Board fences are objectionable because they shade the garden and often prevent free surface drainage.

Drainage.—Many garden soils require drainage. The need of it is indicated by the following conditions: Moss growing on the surface, plants looking yellow or dwarfed, and water standing more than three hours after a rain.

A soil may be drained by laying the land off in beds, by open drains, and by covered drains. The laying off of the land in beds is used chiefly in winter gardening. The open drain is usually not deep enough to remove more than the surface water. It frequently occupies space needed for the growing of crops and the sides often furnish a place for weeds to grow. A covered drain is more satisfactory, because it removes the surplus soil water and allows the rain to penetrate.

A covered drain should be placed in the lower section of the garden. It is made as follows: A ditch 4 feet deep should be dug and the lower 2½ feet filled with tin cans, boards, or stone, so placed that there will be space between to hold water. The drain is then covered with garden soil. No drain is satisfactory unless it has an outlet. This makes drainage a community problem in cities. Quite often a city gardener can not drain his garden satisfactorily unless his neighbors combine with him and together they drain all their gardens by carefully laid tile drains.

A well-drained soil is more productive because it is warmer and contains the right amount of air and moisture. These soil conditions promote the decay of organic matter, increase the amount of available plant food, and enable the roots to penetrate deeper and obtain more moisture during a dry spell.

Tilling.—The soil should be broken up in the spring just as early as possible, and yet it should not be handled while wet. In the early spring, every day's delay in preparing the soil means loss by evaporation of large quantities of soil moisture which will be needed later by the growing crop. Of all the garden soils, clay is the most easily injured by working when it is not in the right condition as to moisture. If worked too wet, the particles all slide together into a compact mass. On the other hand, if worked too dry, the clods are hard to break. When clay soil is in the right condition to work, it will crumble apart when squeezed in the hand. If it sticks together, it is too wet. Clay soil should never be worked when it is wet, not even with a hoe. This is an important lesson for all gardeners.

The soil should be made mellow to a depth of at least 8 inches by deep plowing and thorough harrowing. To get the best results, the soil should be both plowed and harrowed the same day. If the garden is small, better results may be obtained by spading the soil thoroughly with a spading fork, crushing each spadeful of soil, removing the grass roots and roots of perennial weeds before another is lifted, and finally leveling the top soil with a garden rake.

A deep-mellow soil causes the plant to grow more quickly, for large root systems can be developed and more food and moisture taken in. It also affords a larger reservoir to hold rain needed during the droughts that come in the growing season. Such a soil is warmer and contains air needed for the growing roots and for the decay of organic matter.

Adding of material.—A liberal dressing of well-rotted manure, plowed or spaded into the soil supplies plant food, makes the soil mellow, and seems to hold moisture during dry seasons. Manure may be added at the rate of 40 tons per acre. Some of the best gardeners are using finely-pruned bone meal at the rate of 1,000 pounds per acre and tobacco stems at the rate of 3 tons per acre. These are applied after plowing or spading rather than before, so they will not be buried too deeply. Bone meal supplies phosphorus and lime. Tobacco stems supply potash and nitrogen. These plant foods are necessary to the growth of vegetables. Truckers use from 20 to 100 tons of stable manure to the acre in addition to 1,000 to 2,000 pounds of

a high-grade commercial fertilizer each year, and market from \$1,000 to \$1,500 worth of vegetables each year. Occasionally the addition of sand is needed to help change a clay soil into a good-garden soil.

To grow well vegetable plants require a deep, mellow, moist soil, supplied with the right amount of air, heat, and available plant food. The soil for vegetable crops is a rich sandy loam—a soil containing varying proportions of clay, sand, and organic matter. A good vegetable soil can be made in most back yards by intelligent management.

ORGANIC MATTER FOR THE HOME GARDEN.

Fifth grade, Projects II, IV, IX.

Sixth grade, Projects III, V, X.

Seventh grade, Project I.

Sources of organic matter.—Organic matter can be supplied in three ways—first, by an application of stable manure; second, by growing and turning under green manuring crops, such as clover and rye; and third, by making a compost of autumn leaves and garden refuse for later application.

Stable manure.—Working stable manure into the soil is considered the best way of increasing the supply of organic matter. The value of stable manure varies with the amount of straw or other absorbent that it contains. It also varies with the kind and amount of food that was fed to the animal producing it. The manure of horses, cows, and pigs has about the same value per ton as far as organic matter and plant food are concerned. Hen manure is low in organic matter, but very high in plant food. For this reason it should be applied sparingly.

Well-rotted manure is much better for the production of vegetables than fresh manure. When fresh manure is used for the garden it should be used either in the fall for the growing of green manuring crops or in the making of the compost pile. One bushel of manure mixed with three or four times that quantity of leaves, grass cuttings, etc., would equal fully 2 bushels of organic matter for the garden next spring.

Green manuring crops.—The section of the garden not to be used for winter vegetables should be planted in green manuring crops—crimson clover, hairy vetch, winter oats, or rye. Crimson clover at the rate of 15 pounds per acre can be planted with seven-top turnips, at the rate of 6 pounds per acre, the early part of August, or it may be planted alone up to October 1. The other crops are planted in late September or early October, winter oats at the rate of 3 bushels to the acre and rye at the rate of 2 bushels to the acre. Hairy vetch should be planted with winter oats or rye at the rate of 30 pounds per acre with 1 bushel of oats or rye. Crimson clover is used for small gardens. Some gardeners, to insure a good stand, plant it at the rate of 30 pounds per acre.

Crimson clover and hairy vetch are superior to rye and oats, in that they are able to transfer nitrogen from the air into the soil by means of bacteria which live in the nodules on their roots. When a crop of crimson clover and hairy vetch are turned under, the soil received an additional supply of nitrogen, which is the form of plant food necessary to make the vegetables grow rapidly and to develop large and green leaves. The clover and vetch, however, have a tendency to harbor aphids, and for this reason some gardeners prefer to use rye or oats and supply the additional nitrogen plant food through commercial fertilizer.

The soil for the green manuring crop should be prepared as follows: Either fresh or well rotted manure may be used. Fresh manure should be applied at the rate of 40 tons per acre or well rotted at the rate of 20 tons per acre. These should be thoroughly mixed through the soil

by deep plowing or harrowing or by spading and raking. In addition some gardeners use tobacco stems at the rate of 3 tons per acre. These are applied after the ground is plowed or spaded and worked into the surface soil with a harrow or hoe. When tobacco stems can not be obtained, a high grade commercial fertilizer is used at the rate of 1,000 pounds per acre. Additional drainage is needed during the winter months, but open drains will usually take care of this.

The seeds of any green manuring crop are scattered evenly over the soil and then carefully raked in. This can best be done on a day when there is no wind.

For the best results, green manuring crops should be turned under in early spring, while they are green enough to decay rapidly and not interfere with the cultivation of the vegetable crops. They should also be turned under early before they use the soil moisture needed for the vegetables. If plowing or spading is followed by deep harrowing or raking, the crop will be mixed thoroughly in the soil and will decay more rapidly. To hasten decay and to supply phosphorous plant food, bone meal at the rate of 1,000 pounds per acre should be applied and thoroughly harrowed or raked into the soil. This section of the garden is now ready to plant with a spring crop. Irish potatoes, beans, and corn will grow better in this section of the garden than onions or lettuce.

The green manuring crops have an additional value of making the gardens attractive during the winter months.

The compost pile.—A compost made as late as October should be ready for application in March. A good arrangement for making a compost pile is as follows:

Six inches of leaves.	Repeat.
One-fourth inch of finely ground bone meal.	
Six inches of leaves.	
Six inches of stable manure, or as much more as may be available.	
	Cover the pile with 6 inches of soil.

Street sweepings may be substituted for the stable manure. Any organic refuse may be utilized. Wood ashes or finely ground limestone may be used instead of bone meal. Laundry water poured in the pile from time to time will cause the leaves to decay more rapidly. Again if the compost pile can be turned over and its parts thoroughly mixed each month, the decay will be more rapid.

Use of organic matter.—Organic matter makes a soil mellow, warm, well ventilated, and capable of holding and retaining moisture. It renders the soil plant food available. Furthermore, it produces a soil very easily cultivated. It encourages a larger root system, resulting in better yields. It makes the soil warmer for winter and early spring vegetables. It also makes a soil more capable of producing a crop during a dry season.

Every gardener who makes provision for organic matter in liberal quantities for the garden soil will have a larger crop the following year at a less expenditure of labor.

FALL CLEANING UP OF THE GARDEN.

Fifth grade, Project II.
Sixth grade, Project III.
Seventh grade, Project I.

Reasons.—The gardener who cleans up and spades his garden in the fall will not have so many insect enemies the following spring, for in the fall such insects as the tomato worm burrow into the soil to spend the winter. Not only insects like the tomato worm, but also those like the cutworm that live in the soil will be exposed to their bird enemies and to the weather by fall tillage. Another enemy, the imported cabbage butterfly, just at this period in the chrysalis

stage and hanging by a silken thread from many a friendly weed, will also be destroyed. Weeds, as well as unmarketable vegetable plants, such as cabbage and collard left growing in the garden, serve both as food and shelter for hibernating potato bugs, flea beetles, harlequin bugs, and cabbage aphides.

Fall tillage also causes many weeds to be turned under before they go to seed and while they are green enough to decay rapidly. This adds organic matter to the soil. While making use of these weeds as green manure, however, the gardener must be careful about the roots of perennial weeds. These should be raked off, dried and burned, or fed to pigs.

Cleaning up the garden also tends to check diseases of various vegetable plants. The diseases of the cabbage, tomato, or bean are carried over from one season to the next in the diseased portions of the stems, leaves, or fruit. For this reason all cabbage, tomato, and bean plants should be pulled up and burned.

A garden that is carefully cleaned up in the fall is much more attractive, furnishes more space for growing winter vegetables, or green manuring crops, and is practically ready to plant the following spring.

What should be done with the garden refuse?—All diseased plants, grass, and perennial weeds should be put in a pile and burned. All other material may be put in the compost pile to decay.

PLANTING CALENDAR.

Fifth grade, Projects I, III, VI, VII, X, XI, XV, XVI.

Sixth grade, Projects I, IV, VI, VII, XI, XII, XIV, XV.

Seventh grade, Projects I, III, XIII, XV.

January.—Beets; cabbage; lettuce.

February.—Beet seed; beet plants; garden peas; kale; mustard; onion sets; parsley; rape; spinach.

Cabbage; cauliflower; canteloupe; cucumber; lettuce; pepper; tomato.

March.—Beet seed; beet plants; cabbage plants; carrot; garden peas; Irish potatoes; lettuce seed; lettuce plants; mustard; onion seed; parsley; parsnip; rape; salsify; spinach.

Sweet potatoes.

April.—Beet seed; cauliflower plants; carrot; corn; cucumber; canteloupe; garden peas; Irish potatoes; kale; lettuce seed; mustard; parsley; parsnip; rape; salsify; shell beans; snap beans; squash.

Celery.

May.—Butter beans; canteloupe; corn; cornfield peas; cucumber; pumpkin; tomato plants; okra; pepper plants; snap beans; squash; sweet potato plants.

Collard.

June.—Butter beans; cornfield peas; corn; okra; pumpkin; snap beans; sweet potato plants.

Cabbage; cauliflower.

July.—Beet; bush butter beans; cabbage plants; carrot; celery plants; collard plants; corn; cornfield peas; Irish potatoes; kale; squash; snap beans; tomato plants; turnip.

August.—Cabbage plants; cauliflower plants; celery plants; carrot; kale; mustard; parsley; rape; spinach; turnip.

Endive; lettuce; onion.

September.—Endive plants; lettuce plants; kale; mustard; multiplier onion sets; onion seed; rape; spinach; turnip.

Cabbage; lettuce.

October.—Cabbage plants; lettuce plants; onion plants; onion sets; turnip.

November.—Cabbage plants; onion sets.

For exact dates of planting and for varieties see "Schedule."

PLANTING CHART.

Fifth grade, Projects I, III, VI, VII, X, XI, XV, XVI.

Sixth grade, Projects I, IV, VI, VII, XI, XII, XIV, XV.

Seventh grade, Projects I, III, XIII, XV.

Vegetables.	Amount of seed to buy for 100 feet of row.	Distance between rows (inches).	Depth to plant seeds (inches).	Number of seeds to sow per foot.	Distance between plants (inches).	Time to first maturity (days).	Yield per 100 feet of row.
Beets.....	1 ounce.....	18	$\frac{1}{4}$	12	3	90	3 bushels.
Butter beans (bush).....	1 pint.....	24	1	3	4	80	2 bushels.
Butter beans (pole).....	1 pint.....	24	1	3	4	80	3 bushels.
Cabbage.....	1 package.....	36	$\frac{1}{4}$	24	24	90	50 heads.
Carrots.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{4}$	20	3	90	3 bushels.
Cauliflower.....	1 package.....	36	$\frac{1}{4}$	24	24	90	50 heads.
Celery.....	1 package.....	36	$\frac{1}{4}$	20	6	120	16 dozen.
Corn (sweet).....	$\frac{1}{4}$ pint.....	36	2	4	12	90	16 dozen.
Corn (pop).....	$\frac{1}{4}$ pint.....	30	2	4	6	120	30 dozen.
Cornfield peas.....	1 pint.....	36	1	3	4	90	3 bushels.
Cucumber.....	$\frac{1}{2}$ ounce.....	48	1	4	30	70	100 dozen.
Garden peas.....	1 pint.....	24	2	18	$\frac{1}{2}$	60	1 bushel.
Irish potatoes.....	$\frac{1}{2}$ peck.....	36	4	(pc.) 1	12	90	3 bushels.
Kale.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{2}$	20	6	80	5 bushels.
Lettuce (head).....	$\frac{1}{4}$ ounce.....	12	$\frac{1}{4}$	20	12	60	100 heads.
Mustard.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{4}$	20	3	60	2 bushels.
Okra.....	1 ounce.....	36	2	4	24	90	40 dozen.
Onion (seeds).....	$\frac{1}{2}$ ounce.....	18	$\frac{1}{2}$	12	3	140	1 bushel.
Onion (sets).....	2 quarts.....	18	3	4	3	100	1 bushel.
Pepper.....	1 package.....	36	$\frac{1}{4}$	24	24	120	6 bushels.
Parsley.....	$\frac{1}{4}$ ounce.....	24	$\frac{1}{4}$	20	3	100	3 bushels.
Parsnips.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{4}$	20	3	140	3 bushels.
Pumpkins.....	$\frac{1}{2}$ ounce.....	60	1	10	42	120	10 dozen.
Rape.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{2}$	20	4	75	2 bushels.
Salsify.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{4}$	20	3	140	3 bushels.
Snaps (bush).....	$\frac{1}{2}$ pint.....	24	1	6	2	55	2 bushels.
Snaps (pole).....	$\frac{1}{2}$ pint.....	36	1	3	4	90	5 bushels.
Spinach.....	1 ounce.....	24	$\frac{1}{2}$	20	3	60	2 bushels.
Squash.....	$\frac{1}{2}$ ounce.....	48	1	4	36	60	64 dozen.
Swiss chard.....	1 ounce.....	24	$\frac{1}{2}$	20	12	75	5 bushels.
Sweet potato.....	3 pounds.....	36	5	.....	15	150	2 bushels.
Tomato.....	1 package.....	36	$\frac{1}{4}$	24	24	120	6 bushels.
Turnip.....	$\frac{1}{2}$ ounce.....	24	$\frac{1}{2}$	20	3	60	3 bushels.

For time of planting and varieties see "Planting calendar" and "Schedule."

SCHEDULE OF PLANTING DATES AND VARIETIES.

Fifth grade, Projects I, III, VI, VII, X, XI, XV, XVI.

Sixth grade, Projects I, IV, VI, VII, XI, XII, XIV, XV.

Seventh grade, Projects I, III, XIII, XV.

BEETS.

For the earliest spring crop.—Sow seed in hotbeds in January for plants to put into the garden in February and March—Crosby's Egyptian.

For the spring crop.—Sow seed in garden February 20 to March 15—Crosby's Egyptian.

For the fall crop.—Sow seed in garden July 1 to 15—Red Blood.

BUTTER BEANS.

For the summer crop.—Sow seed in garden May 1 to July 15. Bush variety—Henderson's Bush. Pole variety—Carolina or small butter beans.

CABBAGE.

For the spring crop.—Sow seed of Charleston Wakefield in seed beds in September for plants to put into garden in November for heads in May.

For the summer crop.—Sow seed of Charleston Wakefield in hotbeds in January for plants to put into garden in March for heads in June and July.

For the fall crop.—Sow seed of Henderson's Succession, Indian Summer, Flat Dutch, Drum-head, or Savoy in seed beds June 1 to 15 for plants to put into garden August 1 to 10 for heads in October.

CANTELOUPE.

For the earliest crop.—Plant seed in berry boxes in hotbeds in February for plants to put into garden as soon as danger of frost is over—Rocky Ford.

For the summer crop.—Plant seed in garden as soon as danger of frost is over—Rocky Ford.

CARROT.

For the summer crop.—Sow seed in garden March and April—Chantenay, Ox Heart, Half Long Danvers.

For the late fall and winter crop.—Sow seed in garden July 15 to August 15—Chantenay, Ox Heart, Half Long Danvers.

CAULIFLOWER.

For the summer crop.—Sow seed in hotbeds in January for plants to put into garden in March for heads in June—Dry Weather, Snow Ball.

For the fall crop.—Sow seed in seed beds in June for plants to put into garden in August for heads in October.

CELERY.

For the fall crop.—Sow seed in seed beds in April for plants to put into garden July 15 to August 15—Self Blanching, White Plume.

For the winter crop.—Sow seed in seed beds in April for plants to put into garden August 1 to 15—Giant Pascal.

COLLARDS.

For the fall and winter crop.—Sow seed in seed beds in April and May for plants to put into garden in June and July to mature in November—North Carolina Short Stem, Georgia.

CORN.

For the summer crop.—Sow seed every two weeks from April to August—Early Catawba, Country Gentleman, White Evergreen.

For the fall crop.—Sow seed July 1—Stowell's Evergreen.

CUCUMBER.

For the earliest crop.—Plant seed in berry boxes in hotbeds in February for plants to place in garden as soon as danger of frost is over—Long Green, White Spine, Japanese Climbing.

For the summer crop.—Sow seed in garden as soon as danger of frost is over—Long Green, White Spine, Japanese Climbing.

For pickling purposes.—Sow seed of Gherkin in garden in July.

EGG PLANT:

For the summer crop.—Sow seed in hotbeds in February for plants to put into garden as soon as danger of frost is over—New York Purple.

ENDIVE.

For the winter crop.—Sow seed in seed beds August 15 to 30 for plants to put into garden September 15 to 30 for heads in December and January.

GARDEN PEAS.

For the spring crop.—Sow seed in garden in February, March, and April—Alaska, Gradus, Telephone, Marrowfat.

For the fall crop.—Sow seed in garden August 1 to 15—Marrowfat.

IRISH POTATOES.

For the summer crop.—Plant Irish Cobbler from February 20 to April 17.

For the fall crop.—Plant Green Mountain from July 1 to 15.

KALE.

For the spring crop.—Sow seed in garden March 1 to April 15—Scottish Curled.

For the fall crop.—Sow seed in garden July 15 to August 15—Scottish Curled.

For the winter crop.—Sow seed in garden September 10 to October 15—Siberian.

KOHLE RABI.

For the summer crop.—Sow seed in garden March 1 to April 15—Early White Vienna.

For the fall crop.—Sow seed in garden August 1 to 15—Early White Vienna.

LETTUCE.

For the April crop.—Sow seed in flats in the house or in hotbeds January 1 to 15 for plants to put into cold frames in February for heads in April—Tait's Giant Forcing, Simon's Tennis Ball.

For the May crop.—Sow seed in flats in the house or in hotbeds February 1 to 15 for plants to put into the garden in March for heads in May—Tait's Giant Forcing, Simon's Tennis Ball.

Sow seed of Mignonette in garden March 1 to 10 for heads the last of May.

For the June crop.—Sow seed of New York in cold frames February 1 to 15 for plants to put into the garden in April for heads the first of June.

For the November crop.—Sow seed of Simon's Cabbage Head in seed beds August 1 to 20 for plants to put into garden in September for heads in November.

For the December crop.—Sow seed of Simon's Cabbage Head in seed beds September 1 to 15 for plants to put into garden in October for heads in December. This crop may need to be protected from cold.

For the January crop.—Sow seed of Simon's Cabbage Head in seed beds September 15 to 30 for plants to put into cold frames in October for heads in January.

MUSTARD.

For the spring crop.—Sow seed in garden from February 15 to March 15—Giant Southern Curled, Ostrich Plume, Chinese.

For the fall crop.—Sow seed in garden from August 15 to September 15—Giant Southern Curled, Ostrich Plume, Chinese.

OKRA.

For the summer crop.—Sow seed in garden May 2 to June 20—Dwarf Green, Perkins's Mammoth, Kleckley's Favorite.

ONION.

For the earliest spring crop.—Plant Richmond Hill or Potato Onion or Multiplier Onion September 1 to 15.

Plant sets of White Pearl, or Prize Taker, in garden in October.

For the spring crop.—Sow seed of White Pearl in seed beds August 1 to 15 for plants to put into garden in October—White Pearl, White Queen, or White Crystal.

Sow seed of White Pearl thinly in rows in garden September 1 to 15.

For sets.—Sow seed thickly in rows in garden in March—White Pearl, Prize Taker.

PEPPER.

For the summer crop.—Sow seed in hotbeds in February for plants to put into the garden as soon as danger of frost is over and the soil is warm—Ruby King and Sweet Pepper Glory, for stuffing; Pimento, for canning; Chili, for hot peppers for pickles.

PARSLEY.

For all year crops.—Sow seed in garden from February to May and again in August—Moss Curled, Double Curled.

PARSNIP.

For the winter crop.—Sow seed in garden from March 1 to May 1—Hollow Crown.

PUMPKIN.

For the fall crop.—Sow seed in garden from May 1 to June 10—Connecticut Pie, Potato.

RAPE.

For the spring crop.—Sow seed in garden February 10 to March 15—Dwarf Essex.

For the fall crop.—Sow seed in garden August 15 to October 1—Dwarf Essex.

SALSIFY.

For the winter crop.—Sow seed in garden March 1 to May 1—Mammoth Sandwich Island.

SHELL BEANS.

For the main crop.—Sow seed in garden May 1 to July 15. Bush varieties—Red Kidney Michigan, Navy. Pole varieties, Cress Back.

SNAP BEANS.

For the summer crop.—Sow seed in garden May 1 to July 15. Bush varieties—Red Valentine, Burpee's Green Podded Stringless, Henderson's Bountiful. Pole varieties—Kentucky Wonder.

SPINACH.

For the spring crop.—Sow seed in garden February 15 to March 15—Savoy.

For the summer crop.—Sow seed in garden April 1 to May 15—New Zealand.

For the fall crop.—Sow seed in garden August 15 to September 15—Savoy.

SQUASH.

For the earliest crop.—Sow seed in garden March 15 to April 15—Cymbling and Crook Neck. These may need to be protected from cold.

For the fall crop.—Sow seed in garden in July—Hubbard.

SWISS CHARD.

For the summer crop.—Sow seed in garden in April—Lucullus.

TOMATO.

For the earliest crop.—Sow seed in hotbeds in February for plants to put into garden April 1 to May 7—Earlianna, June Pink, Chalk's Jewel. They may need to be protected from cold.

For the main crop.—Sow seed in hotbeds in February for plants to put into garden May 1 to 15—Ponderosa, Brimmer.

For canning purposes.—Sow seed in seed beds in April for plants to put into garden in June—Stone.

TURNIP.

For the fall crop.—Sow seed in garden July 15 to August 15—Purple Top.

For the winter crop.—Sow seed in garden August 15 to October 15—Seven Top.

NOTE.—These planting dates for the vegetables mentioned are for the Piedmont region of the southern section of Virginia and the northern section of North Carolina.

For other varieties, consult "seed catalogues."

For how to plant these vegetables see "Planting chart."

SEEDS FOR THE GARDEN.

Fifth grade, Project VI.

Sixth grade, Project VI.

Seventh grade, Project XI.

What does a seed contain?—A seed contains an embryo plant and sufficient food to nourish the plant until it has grown enough roots and leaves to nourish itself. The kind of plant the seed will grow into depends upon its parentage. Beet seeds look alike, yet one kind will grow into beets that are ready to harvest in 90 days, and the other kind will not be ready to harvest for 120 days. This difference is due to the selection of the seed plants.

Factors to consider in purchasing seed.—(1) Freshness; seeds purchased in bulk are always more likely to be fresh than those in small packages. (2) Variety; the most desirable varieties of seed are purchased from reliable seed farms. Too much emphasis can not be placed upon the importance of purchasing seeds from reliable seed farms that make a specialty of selecting

seed plants and furnishing seeds of high quality. Consult "Schedule" for good varieties to plant for the different seasons. Also consult "seed catalogues" for good varieties.

Seed growing.—Seed growing has developed into a special class of farming. Seed farms are located where the soil and climate are especially favorable for the best development of the particular vegetable to be grown. For instance, cabbage thrives well in a cool climate, and therefore these seed are best grown in the North. Many cabbage seed farms are located in Connecticut and Long Island. Watermelons, on the other hand, are a warm weather crop, so these seed farms are located in Georgia. Lima bean and field pea seed farms are located in California, where the soil and climate are especially favorable for growing these crops.

The seeds are produced from carefully selected seed plants. A stunted plant is likely to produce poor seeds, and so these plants are given special attention throughout the growing season and provided with all conditions favorable for a continuous healthy growth. Any undesirable plant is pulled up before it blossoms, and only perfect plants are allowed to blossom and produce seed. All this requires much individual attention from experienced persons. This is the reason selected seed are more expensive than other seed. The quality of the crop raised from such seed, however, more than pays for the additional expense.

Since seed growing is a specialized business, requiring much skill and experience, it would be far better for the average home gardener to purchase his seed from reliable seed farms than to try to raise them himself.

Reasons for poor seeds.—Seeds may be too old to germinate. Lettuce seed can be kept for four years and still germinate, while onion seed can not be kept more than one year. The seed crop may have been grown under unfavorable conditions. The seed may not have been ripe when they were gathered. They may not have been properly cured or stored. Infected seed should not be planted; for example, pea seed containing weevils or bean seed with anthracnose.

Why do good seeds sometimes fail to come up?—They may not have been planted at the proper depth, which depends upon the kind of seed. Small seed like lettuce should not be planted over one-fourth of an inch deep. Large seeds are planted at varying depths, depending on whether the food is stored, on the endosperm or on the seed leaves, and also on whether the seed leaves are lifted above the surface or left in the soil. Corn in which the food is stored in the endosperm may be planted 4 inches deep. Peas in which the food is stored in the seed leaves that are left in the soil may be planted 2 inches deep. Beans in which the food is stored in the seed leaves that are lifted above the surface should be planted only 1 inch deep. Otherwise the seed leaves will be torn off in trying to force their way through the soil and the plant will be stunted.

The depth to plant seed also depends upon the condition of the soil, the fineness of the soil particles, the amount of soil moisture, and the temperature of the soil. The soil in the seed bed should always be made fine and mellow and all the lumps crushed, for seed do not need to be planted so deeply in such a soil as in a lumpy soil. The seeds also germinate more quickly in a fine, mellow soil. If the soil is moist and cold, the seeds should be planted shallower than if it is dry and warm. Seed vary in the soil temperature requirements for germination, and no time is gained in the spring by planting summer vegetable seed before the soil is warm enough to cause them to sprout. For instance, garden peas, which are distinctly a spring vegetable, may be planted much earlier than beans, which are a summer crop. It is also true that the seeds of cool weather vegetables will not germinate in a soil that is too warm, and this is why the seed beds for raising August collard, cabbage, lettuce, and onion plants should be located in the coolest section of the garden, and as far as possible in a section where it will be convenient to water them occasionally. Ordinarily soil that has been freshly worked will contain enough moisture to soak the seed thoroughly and cause it to germinate without extra

help. If, however, the soil is dry when seeds are planted in late July and August, first thoroughly water the soil in the row, then plant the seeds and cover them with soil. Large seeds with hard seed coats should be soaked in water for 24 hours before they are planted.

Quite frequently seeds fail to come up because commercial fertilizer was put in the rows when the seeds were planted. Commercial fertilizer should be spread evenly all over the soil when the garden is being prepared for planting, or it should be spread and worked in between the rows of the growing crop. But it should never be put in the rows when the seeds are planted.

For depth to plant the different garden seeds, consult "Planting chart"; for time to plant the seeds consult "Schedule."

THE GARDEN PLAN.

Fifth grade, Project VI.

Sixth grade, Project VI.

Seventh grade, Project XIII.

Purpose.—In a carefully worked out plan every square foot of garden space should be utilized. Provision may be made to furnish the family with a continuous supply of fresh vegetables throughout the gardening season. The surplus space may be used for vegetables to be canned, stored, or marketed. The vegetable families should be rotated in order that the members of the same family will not occupy the same section of the garden for two successive years. The entire supply of seeds should be ordered early, so that there need be no delay when the planting season arrives. The materials used for spraying purposes should also be purchased in advance.

Factors to consider in planning a garden.—First, the tall growing vegetables, such as pole beans, corn, tomatoes, and okra ought to be placed where they will not shade the low-growing vegetables. Next, the low-growing vegetables should be grouped according to the time they need to mature. Those that mature in 50 to 70 days should be planted together in one section, those that mature in 70 to 100 days in another, and those from 100 to 150 days in still another section. This makes it possible to respade any section before the next crops are planted. To get the best results the soil should be respaded before each planting. The "Planting chart" will tell the time needed for the different vegetable crops to mature.

Making the garden plan.—First make a chart of the vegetables to be planted in the garden. The chart should consist of the following headings:

Vegetables desired.	Yield required.	Total length of rows needed.	Quantity of and necessary.	Variety.

Under the first heading group the list of vegetables to be planted as follows: Place the tall vegetables together, and the low-growing vegetables together, according to the time needed to mature. Under the second heading estimate the yield required for each vegetable. Having this data, the total length of the rows needed, and the quantity of seed necessary, can be easily obtained by consulting the "Planting chart."

After this chart of the garden crops has been made, draw a plan showing the number of rows necessary for each vegetable named in the chart. Indicate the distance apart of the rows, and the distance between the plants in the rows. The "Planting chart" will give the information necessary for this. The "Schedule" will tell which varieties to plant in the different seasons.

Vegetable families.—Mustard family: Mustard, kale, rape, turnip, radish, cabbage, collard, cauliflower, Brussel sprout. Goosefoot family: Beets, spinach, Swiss chard. Nightshade family: Potatoes, tomatoes, pepper, egg plant. Thistle family: Lettuce, endive, salsify. Carrot family: Carrot, parsnip, celery, parsley. Gourd family: Cucumbers, squash, pumpkin, muskmelon, cymbling, cantaloupe, watermelon. Bean family: Garden peas, field peas, snap beans, butter beans.

RAISING VEGETABLE PLANTS.

Fifth grade, Project VII.

Sixth grade, Project VII.

Seventh grade, Project XIV.

Advantages.—There are several advantages in raising from seeds such plants as lettuce, cabbage, tomatoes, peppers, and eggplants. In the first place, it is much cheaper to raise the plants than it is to purchase them. One ounce of any of the seeds mentioned will usually produce enough plants for the home gardens in an entire school district. Again, in purchasing plants there is danger of introducing into the garden soil certain diseases, such as club root of cabbage or wilt of tomatoes. Both of these diseases are widespread, and care needs to be taken not to inoculate the garden soil with them. Once these diseases become established, a long time is needed before the soil can produce a successful crop of the same vegetable. Infected plants may also introduce nematode worms into virgin soil. These worms live in the roots of lettuce, tomatoes, and cucumbers; they cause swellings that interfere with the passage of water and stunt the growth of the crop.



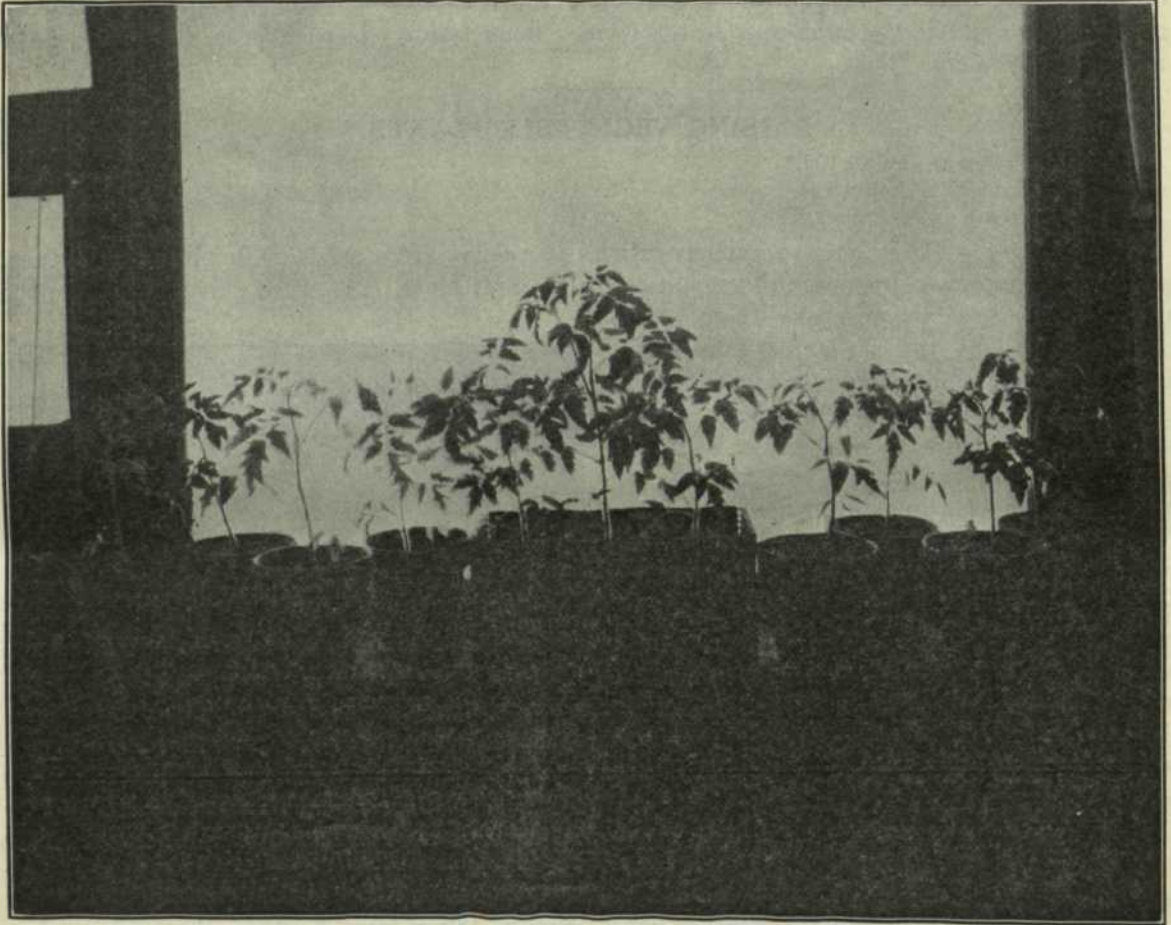
Planting a flat.

Another reason for raising plants from seeds is that select varieties can be secured in this way. There is also the advantage of having the plants on hand when the garden soil is warm enough to receive them and the weather conditions are favorable. Further, the gardener has the pleasure of watching the growing of the crop from the time of planting the seed to the time of harvesting the products. This is a factor not to be minimized, for the successful gardener enjoys watching the growing plants and studying their cultural environments and harvesting possibilities.

When and where seeds are planted.—Cabbage, lettuce, and beets in hotbeds in January; lettuce in flats, in house, in February; tomatoes and peppers, either in hotbeds in February or in flats in the house in February; cucumbers and melons in strawberry boxes, in hotbeds in February; sweet potatoes in hotbeds in March; celery, collard, and late tomatoes in seed beds in April; collards in seed beds in May; fall cabbage in seed beds in June; onions and lettuce in seed beds August 1 to 15; endive in seed beds August 15 to 30; winter cabbage in seed beds September 15 to 30. For varieties to plant, see "Schedule."

FLATS.

Preparation of flats.—A flat is a box 3 to 4 inches deep by 12 inches wide and 16 inches long. It is filled with a layer 1 inch deep of leaf mold, topped with 2 to 3 inches of sifted wood soil. If wood soil can not be secured, a good soil can be made of one-third mellow soil, in which no vegetables have been raised, one-third medium sand, and one-third leaf mold. These ingredients should be thoroughly mixed, then sifted to remove any stones. A soil sieve can be made by securing any strong wooden box whose sides are 8 by 10 and depth 4 by 6 inches and



Tomato plants raised in a classroom window.

replacing its bottom with wire mosquito netting, or one-fourth-inch galvanized-iron mesh. To prevent drying out the sifted soil should be pressed down to within 1 inch of the top of the flat. A board 4 by 6 inches can be used for the purpose.

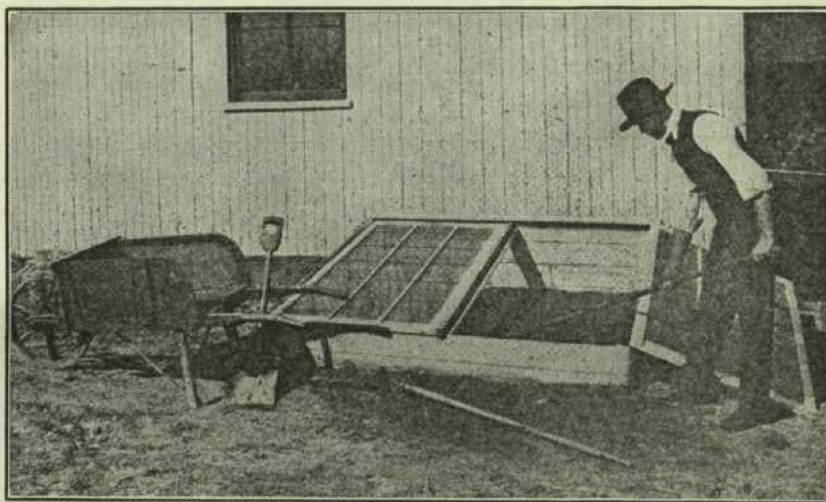
Planting and care of flat.—As soon as the flat is prepared the seed should be sown thinly, not over 24 to the foot, in rows one-fourth of 1 inch deep and $2\frac{1}{2}$ inches apart. The soil should then be leveled, a sheet of newspaper placed on the surface, and lukewarm water poured on it. The paper holds the soil in place and allows the water to pass through gradually. The paper should be left on the soil until the seeds have germinated, for it serves to check surface evaporation and makes watering easier. During this time the flats can be kept in any warm

room at home or school. When the seeds have germinated they should be placed near a warm, sunny window and turned each day to prevent the plants being drawn toward the sunlight. Watering should be done with a brush broom or a fine spray, so as not to break or bend the tender plants. When the plants are 4 inches high and begin to crowd each other they should be transplanted into other flats or into pots.

HOTBEDS.

Location.—Hotbeds should be located where they will not interfere with the regular garden operations, and care must be taken that they receive the maximum amount of sunlight and have sufficient drainage. They should be protected from the cold north wind by a hedge or building, but they should never be located so close to a building that snow falling from the roof can break the glass.

Construction.—As the ground is too wet in the early spring, when it is time to plant the hotbed, the frames should be made, the pit dug, and the top soil provided in the fall. The size of a frame will depend upon the number of plants needed for the garden and the kind of sash used, whether a window sash or a regular hotbed sash, 3 by 6 feet. The frame is made of 2-inch boards, well seasoned. It is 12 to 15 inches high on the north side and 8 to 10 inches high on the south side. The slope insures removal of rain water and allows sunlight to reach more parts of the frame. The length and width of the frame depend upon the size of the sash secured for covering. The excavation is 18 inches deep, with a length and width corresponding to the inside measurements of the frame. The frame should be placed on top of the pit and the outer sides banked with soil. The pit should then be filled with leaves and the frame covered.



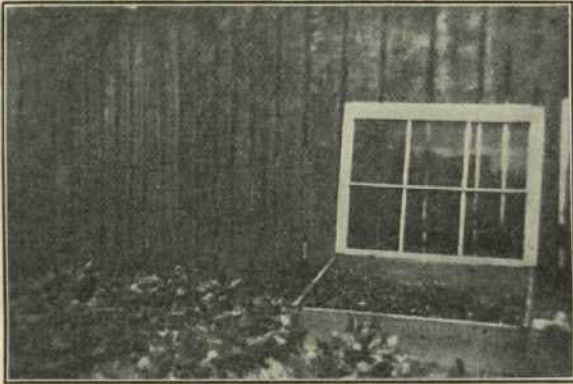
Frame for raising plants.

At the same time pile near the pit enough rich mellow soil, in which no vegetables have been grown, to make a layer 6 inches deep in the hotbed. This will be the top soil for the hotbed in the spring. If mellow garden soil can not be procured a good top soil may be made as follows: One-third soil in which no vegetables have been grown, one-third well-rotted manure, and one-third coarse sand. In January, about four days before the hotbed is to be used, the leaves should be removed and the pit should be filled as follows: Three inches of coal cinders, 2 inches of leaves, 8 inches of fresh horse manure thoroughly packed and well watered, 6 inches of rich top soil, well packed and watered. The coal cinders and first layer of leaves provide drainage and prevent the filling resting on the cold subsoil. The decaying manure will furnish the bottom heat needed to make the plants grow. After the pit is filled the sash should be placed on the frame and allowed to remain three or four days or until the temperature has dropped to between 75 and 80 degrees. If the bulb of a thermometer is buried in the soil the temperature can be

watched. To develop stocky plants the space between the glass and the surface of the hotbed should be within 15 inches.

Planting.—The planting will vary with the crop. Seed should be sown thinly, not over 24 to the foot, in rows one-fourth of 1 inch deep and $2\frac{1}{2}$ inches apart. Plants, like tomatoes, if transplanted directly into the hotbed soil should be put in rows 4 inches apart and should be placed 4 inches apart in the row. While plants like peppers need be planted only 3 inches apart in each direction. Pots, or berry boxes, to be used for transplanting tomatoes or peppers, or for planting cucumbers or melons, should be filled with top soil, then placed closely together and completely buried in the top soil of the hotbed, and care should be taken to pack the soil well between the pots and to form the soil well in them.

Care of the hotbed.—A piece of shingle $1\frac{1}{2}$ inches wide is a good tool to make a soil mulch. An occasional thorough watering is far better than a sprinkling each day. Ventilation is the big problem. A beginner is likely to keep the frame covered too much. At first the upper end of the sash should be propped up during the sunny part of the day. The height of the propping stick should be gradually increased until finally the plants are covered only on cold nights and mornings or during a drenching rain. Hardy plants stand transplanting better. On cold nights it may be necessary to cover the sash with leaves and burlap. To protect the plants from English sparrows the hotbed should be covered with a screen when the sash is removed.



A small hotbed made by using a window sash for a cover.

Planting.—The distance between the rows will vary with the crop to be planted.

Care.—Same as hotbeds.

COLD FRAMES.

Location.—Same as hotbeds.

Construction.—Same as hotbeds except that fresh manure is not used. The space between the glass and the surface of the cold frame soil should not be over 12 inches.

SEED BEDS.

Location.—The seed bed may be simply a section of a row or it may be a plot 3 by 6 feet inclosed in a frame 4 inches high and covered with a wire screen to keep out enemies. For April, May, and June, and September planting a sunny section of the garden should be selected for the seed bed. For August planting a seed bed made between rows of tall vegetables such as tomatoes and pole beans gives the best satisfaction. The soil here is cooler and the seeds germinate more readily. The shade of the tall vegetables protects the young plants from the hot sun.

Preparation of the soil.—The soil should always be respaded and whenever possible mixed with sufficient sand to produce a sandy loam. To germinate well seeds need enough moisture to become thoroughly soaked. They also need air and a certain amount of heat. Such conditions can be produced in a sandy loam. Seed-bed soil used for raising cabbage plants should be free of manure.

Planting the seeds.—The seeds should be planted thinly, not over 24 to the foot, in rows one-fourth of 1 inch deep and $3\frac{1}{2}$ inches apart. The seed and the entire surface of the seed bed should be covered with a layer of sand or wood soil one-half of an inch deep.

Care of growing plants.—When the plants are 2 inches high a complete fertilizer should be spread over the soil just thick enough to be seen, and then raked in. Care should be taken not to get any on the plants. The fertilizer used for young tobacco plants is good. During droughts the bed should be thoroughly watered.

Transplanting of plants.—The fundamental principles of transplanting are: (1) The plants should be lifted with as much soil as possible, so that the roots will become quickly established in the new soil. Watering the plants two hours before transplanting will insure sufficient soil



Children who are taught how to make and manage hotbeds and cold frames at the school will also make and use them at their homes.

adhering to the roots. (2) The hole must be deep enough to place the plant at the same depth it was before and large enough to spread the roots out well. (3) When the garden soil is too dry for successful transplanting, put some water in the hole and then put in the plant. This is better than pouring the water in after the plant has been transplanted. (4) The soil should be placed a little at a time around the roots, care being taken not to get any in the crown; it should be pressed down evenly, not squeezed against the stem of the plant. (5) The transplanted plants should be shaded in such a way as to exclude the sun and at the same time provide for ventilation.

Potting of vegetable plants.—To insure continuous growth when the plants are placed in the garden, the last transplanting should be from individual pots. While this applies especially to tomato plants, it is equally desirable for others. When tomato plants are 4 inches high they are ready to transplant into pots. Five-inch flower pots, berry boxes, tomato cans, or paper pots can be used for the purpose. If paper pots or tomato cans are used, provision should be made for drainage. A good potting soil is made of one-third well-rotted manure, or wood soil, one-third sand, and one-third good mellow soil that has never produced vegetables. The soil should be pressed firmly into the pot and should come within 1 inch of the top. If only a few plants are needed, they may be placed in pots in a sunny window and given the same attention as potted flowers. If more plants are needed, they should be grown in pots in a hotbed.

LATE FALL AND WINTER GARDENS.

Fifth grade, Projects I, II, III.

Sixth grade, Projects I, IV.

Seventh grade, Project I.

Soil requirements.—A mellow, warm, well drained soil is essential for winter gardening. A clay soil is made mellow (1) by deep, thorough tillage; (2) by a liberal dressing of well-rotted manure; and (3) by adding sand or fine coal cinders as well as wood ashes and bone meal. A soil is made warm not only by the sun's rays, but also by the decay of organic matter and by drainage, which removes the surplus water and checks the loss of heat used in evaporation. To insure drainage for a winter garden it is frequently necessary to prepare beds 8 feet wide, 3 inches high, extending the length of the garden. These beds are made by placing ditches every 8 feet and throwing the soil with the beds on each side. The top of the bed can be leveled with the back of the rake.

Schedule of planting.—The planting of the winter garden commences in April, when salsify, parsley, and parsnips are sown. The first of June collards and fall cabbage are sown in seed beds to be transplanted into rows in the garden the first of August. In July carrots, turnips, and beets are sown. From August 1 to 15 endive, rape, kale, spinach, and mustard are planted in the garden, and lettuce and onions are sown in seed beds to be transplanted into the garden in September. From September 15 to 30 winter cabbage is sown in seed beds to be transplanted into rows in the garden in October. The October onion plants and sets may be planted in the garden.

For a wider range of planting dates consult "Schedule."

Varieties.—The success of the winter garden depends upon good seed quite as much as upon mellow soil. For this reason it is recommended that seeds be purchased from reliable seed firms that make a specialty of selecting the seed plants.

Salsify—Mammoth, Sandwich Islands.

Parsnips—Hollow Crown.

Parsley—Moss Curled.

Carrots—Chantenay.

Cabbage—For fall crop, Henderson's Succession; for winter crop, Charleston Wakefield.

Collard—Southern Short Stem.

Turnips—Purple Top, Seven Top.

Lettuce—Simon's Cabbage Head.

Endive—White Curled.

Rape—Dwarf Essex.

Kale—Siberian.

Spinach—Savoy.

Mustard—Giant Southern Curled.

Onion seeds—White Pearl.

Onion sets—White Pearl, Richmond Hill.

For a wider range of varieties see "Schedule."

Time of harvesting.—The time of harvesting of the fall and winter vegetables depends upon the richness of the soil and weather conditions. Under the most favorable conditions

the dates are as follows: Parsnips, salsify, carrots may remain in the ground during winter and be dug as needed. Parsley will stay green all winter.

Turnips and beets should be covered with soil or stored in pits in November and December.

Cabbage and collards sown in June and transplanted with garden in August will mature in November. Cabbage sown in September and transplanted in garden in October will mature in the spring.

Lettuce sown in August is harvested in November. Lettuce sown in September should be transplanted into cold frames in October and harvested in December.

Endive will stand more cold than lettuce and can be harvested throughout the winter.

Mustard sown in August can be harvested in November.

Rape, kale, spinach, and Seven Top turnip sown in August are harvested during the winter and early spring.

Onion plants and sets planted in September and October will mature in the spring.

How are the crops planted? (See Planting chart.)

Care of the crop during the winter.—The stems of the cabbage plants should be completely covered in soil. This is true also of the collard plants. Some gardeners pile leaves and straw around the stems of the collard plants, while others bend the plants over and cover the stems with soil. Beets and turnips should be covered with soil or stored in pits as soon as cold weather comes. The tops of parsnips and carrots will be killed, but new leaves will grow when the warm spring days come. For protection of endive and lettuce see "Lettuce growing" or "Storage of vegetables."

THE WINTER CABBAGE CROP.

Fifth grade, Projects I, III.

Sixth grade, Project IV.

Seventh grade, Project I.

Varieties.—The truck growers consider Charleston Wakefield the best variety for the winter crop. It takes a few days longer to mature than the New Jersey Wakefield, but on the other hand it develops a much larger head.

How to raise the plants.—The spores of some of the worst diseases of cabbage are distributed on the cabbage seed. For this reason all cabbage seed should be disinfected before they are planted. Dissolve 1 tablet of corrosive sublimate in 1 pint of water. Use either a glass or earthenware dish for the purpose. Leave the seeds in the solution 10 minutes and then put the seeds in pure water to wash off the poison. When taken from the water the seed should be spread out to dry. *Corrosive sublimate is a deadly poison and should be handled with very great care and only by grown people.*

For plants to transplant into the garden in November the seed should be sown, not over 24 to the foot, in a row in the garden or in rows in the seed bed, in the middle of September. If the plants are set out too early in the fall, they will run to seed stalks instead of forming solid heads. The soil in the seed bed should be free of any cabbage disease. It should also be free of manure. This is to protect the plants from maggots, which are always more abundant in very rich soil. The soil in the seed bed can be made mellow by spading in sand. Plant food can be supplied by commercial fertilizer. For the planting of the seeds consult "Planting chart." For the location of the seed bed and care of the growing plants consult "Raising of vegetable plant," "Insect chart," and "Insect control."

Preparation of the soil.—To protect the plants from disease, a section of the garden should be chosen that has not previously grown cabbage. Cabbage needs a deep, rich, mellow well-

drained soil. Well-rotted manure should be thoroughly mixed through the soil by deep plowing and harrowing and by spading. In addition, tobacco stems at the rate of 3 tons per acre should be mixed through the upper soil by harrowing or raking. Tobacco stems are especially helpful to the cabbage crop, not only as a source of potash and nitrogen plant food, but also because of their insecticide value. For further preparation of the soil consult "Winter gardens" and "Preparation of the garden soil."

Transplanting into the garden.—For the distance apart of the rows and of the plants in the row see "Planting chart." For the directions for transplanting see "Raising vegetable plants."

Winter protection.—In transplanting the cabbage plant into the garden, care must be taken to cover the entire stem with soil and at the same time not to get any soil into the head. Experience has shown that it is the stem of the cabbage plant that freezes during the winter. Some gardeners place the cabbage plants in a trench that has been hoed out 3 inches deep. The sides of the trench protect the plants from the winter winds.

Care of the crop in the spring.—For fertilizing and hoeing consult "Care of growing vegetables." For spraying consult "Insect chart" and "Insect control." The first insects to appear are the cabbage aphid, then the imported cabbage worm will come, and possibly the harlequin bug. The first two insects can be controlled completely and easily by the right kind of spray mixture applied as soon as the insect appears. The harlequin bug should be picked off and destroyed.

Harvesting.—The crop should be ready to harvest in June.

Why is the winter crop the most profitable to grow?—In the first place, cabbage is a cool weather crop and grows best in the cool spring months. It is difficult to get a good late fall crop because the seed is too warm in June, when the seed need to be planted to raise vigorous plants to transplant into the garden in August for seeds in November. For the same reason it is difficult to get a good summer crop. But in addition to the soil being too warm for the plants to grow well during the summer months the cabbage has during this period six different insect enemies, any one of which if not controlled could completely destroy the crop.

GROWING OF HEAD LETTUCE.

Fifth grade, Project X.

Sixth grade, Projects I, XI.

Seventh grade, Project III.

Varieties of head lettuce.—For the spring crop use Tait's Giant Forcing. These seeds can be secured from George Tait & Son, Norfolk, Va. For the fall crop use Simon's Cabbage Head. For the hotbed crop use Simon's Cabbage Head. These seeds can be secured from I. N. Simon & Son, 438 Market Street, Philadelphia, Pa. For the growing of crops throughout the season, see "Schedule."

Growing the plants.—For the spring crop the seeds should be planted in February, either in flats in the house or in hotbeds. When the plants are 2 inches high, they should be transplanted with individual pots. These pots should be 3 inches in diameter and can be made of paper. Holes should be made in the bottom of the pot to insure drainage.

For the fall crop the seeds should be sown in seed beds from August 1 to 15.

For the hotbed crop seeds should be sown in seed beds in September. The seed beds should be located the same as for June planting.

"Raising vegetable plants" will tell how to make and care for flats and hotbeds and how to pot the plants and care for the potted plants. It will also tell where to locate the seed

bed, how to prepare the soil, and how to care for the plants. "Planting chart" will tell how thinly to sow the seeds.

Transplanting lettuce plants into the garden.—"Raising vegetable plants" will tell how to transplant the plants. "Planting chart" will tell the distance apart of the rows and of the plants in the rows. Lettuce transplanted into cold frames should be placed 1 foot apart in both directions.

Care of the growing crop.—"Care of growing vegetables" will tell how to apply commercial fertilizer and how to hoe the crop. During freezing weather in November and December the lettuce that is headed will need to be covered with a layer of straw 6 inches deep. The straw should be removed as soon as the weather becomes warmer.

Experience is necessary to grow lettuce under glass. A beginner should continually watch the methods used by a person who is growing lettuce successfully under glass. The following suggestions may be helpful: The space between the glass and the surface of the cold frame soil should not be over 12 inches. If this space is too large, the lettuce plants will grow toward the light and not form into compact heads. A piece of shingle $1\frac{1}{2}$ inches wide is a good tool to use to stir the soil about the plants. An occasionally thorough watering is far better than a sprinkling each day. The plants should always be covered in cold nights and mornings or during a drenching rain. They should also be covered during freezing weather. Occasionally during extremely cold weather they will need an additional covering of leaves and burlap spread over the sash. When lettuce is headed it freezes very easily. At all other times leave the frame uncovered. "Raising vegetable plants" will tell how to make the cold frames.

PLANTING IRISH POTATOES.

Fifth grade, Projects X, XI, XV.

Sixth grade, Project XII.

Seventh grade, Project XV.

Varieties.—Plant Irish Cobbler for the first crop and Green Mountain for the second crop. For both plantings use last year's potatoes.

Time to plant.—Irish Cobbler, March to April 20; Green Mountain, July 1 to 15.

Potatoes to select for planting.—(1) Plant potatoes free from disease. Diseased potatoes are characterized as follows: The skins contain scabs or sunken, discolored areas; the stem end of the fleshy part contain black specks, rings, or discolored areas. Potato diseases are widespread, and when the soil becomes infected it is rendered unsuitable for potato production for a number of years. (2) Use, for planting purposes, potatoes that have been taken from high yielding hills. Through careful selection of high yielding hills the yield of potatoes has been increased from 50 bushels an acre to 700 bushels per acre in four years. This result was secured without much increase of labor, seed, fertilizer, or spraying. Carefully selected potatoes can be purchased from reliable seed firms. (3) The eyes should be shallow and few in number. (4) The potatoes should be medium in size and true to type. (5) They should be mealy and of good color and flavor when cooked.

Treatment of seed potatoes.—Purchase from the drug store 1 ounce of formaline and put this with 2 gallons of water. Soak uncut potatoes in this solution for two hours; remove and spread out to dry immediately. Formaline is irritating to the eyes and to cuts, but not poisonous.

Cutting to plant.—In cutting the potatoes reject all those that are diseased. Gardeners differ in the method of cutting potatoes. A good way is to cut the potatoes so that each piece

will weigh about 3 ounces and will have 3 eyes. The pieces should contain enough of the fleshy part to furnish starch and other plant food to nourish the sprout through unfavorable weather conditions and until the roots become established and the leaves are well grown. Whenever possible cut and plant the potatoes the same day.

The tendency of planting small potatoes is to be condemned. The tendency of such a method is to gradually eliminate the high yielding hills.

Soil requirements.—The potato crop responds quickly to good preparation of soil. If the soil is deep, mellow, and rich, make trenches 6 inches deep and 3 feet apart. This should be done on the day of planting. Spread commercial fertilizer thinly and evenly in the trench at the rate of 8 pounds for every 100 feet of row. Rake the fertilizer well into the soil. Then drop the seed pieces 12 inches apart and cover with 4 inches of soil. As the plants grow draw a little soil into the trench at each hoeing. By the time the vines are 4 inches high the trench will be entirely filled. At this time apply commercial fertilizer at the rate of 8 pounds for every 100 feet of row. Spread it evenly in both sides of the row of potatoes and take care that none gets on the vines. Rake it into the soil until none can be seen.

Planting the crop.—See "Planting chart."

Care of the crop.—Before the plants come up rake the soil to prevent the forming of a crust and to keep down the weeds. The best time to kill weeds is just after they have sprouted. As soon as the plants are up keep the soil between the rows always well hoed to a depth of 2 inches. When the vines are in bloom draw the soil slightly toward the plants to form a small ridge. This is to prevent the potatoes growing out of the ground. Since the potatoes are planted 5 inches deep very little hilling will be required.

As soon as the plants come through the soil they should be kept sprayed with arsenate of lead and Bordeaux mixture until the vines mature. The spray should be thrown in a very fine mist and the vines completely covered.

To protect the plants from their insect enemies consult "Insect chart" and "Control of garden insects."

GROWING OF TOMATOES.

Fifth grade, Project XIII.

Sixth grade, Project XV.

Seventh grade, Project XV.

Varieties.—To insure a supply of tomatoes throughout the growing season, three plantings are necessary. The first planting should consist of a few plants of Earliana. These plants should be in bloom by the time the soil is warm enough to transplant with the garden. The second planting, which is the main crop for table use should be Ponderosa. The third or last planting is used for canning purposes. Stone is a satisfactory variety for this planting. For other varieties of tomatoes consult "Schedule."

Growing the plants.—A gardener in Hartsville, S. C., planted seeds of Earliana in flats in the house on January 1. When the plants had four to six leaves, they were transplanted into pots. By April 1 they were in bloom, and were transplanted into the garden in three rows 250 feet long. On June 1 ripe tomatoes were gathered. Besides supplying two families with tomatoes, the gardener realized \$54.25 in cash. The seeds for the second planting should be sown in February, either in flats in the house or in hotbeds. For the third planting the seeds should be sown in seed beds in April.

"Raising vegetable plants" will tell how to make and care for flats and hotbeds, how to pot and care for the plants, and where to locate and how to care for seed beds. The "Planting chart" will tell how thinly to sow the seeds.

Transplanting the plants into the garden.—A section of the garden should be chosen that has not previously grown tomatoes. This is to protect the plants from tomato diseases. The holes should be large enough to place the plants deeper in the soil than they were in the pots, and should be filled with rich mellow soil. If possible mix one-half cup of commercial fertilizer thoroughly in the soil in each hole. As the plants grow the soil can be drawn toward them until the holes are completely filled. The lower leaves that touch the soil should be removed.

For principles of transplanting see "Raising vegetable plants."

For the distance apart of rows and of plants in the row see "Planting chart."

To prevent the plants from cutworms see "Insect chart, and Control of garden insects."

To protect the plants with water during a drought, a tomato can from which the bottom has been removed may be sunk into the soil near each plant. These should be filled with water during a dry spell.

Staking.—There are two methods of staking tomatoes in general use. One is to prune the tomato vines to one main stalk and tie the stalk to the support, usually a post 2 inches in diameter. The post could be 6 feet long and should be driven $1\frac{1}{2}$ feet into the soil. The other method is to prune the vines to one or two strong shoots and tie the plant to a trellis. A trellis may be made as follows: For the upright pieces use 2 by 2 inch material 6 feet long. These are placed 4 feet apart and driven $1\frac{1}{2}$ feet into the soil. For horizontal pieces use laths. These are placed about $1\frac{1}{2}$ feet apart and nailed to the upright pieces. Strips of cloth 1 inch wide can be used to tie the vines to the support.

The stakes or trellis should be in place before the tomatoes are transplanted into the garden.

Pruning.—There are two methods of pruning tomatoes. One is to prune all the side shoots before they are 2 inches in length, leaving just the main stem to bear fruit. The other method is to allow the shoot directly below the first blossom bud to develop and prune all the other shoots. This leaves the main stem and one side shoot to bear fruit. Some gardeners select a two shoots and the main stem to bear fruit. The plants will require pruning throughout the growing season for they will continually send out side shoots. These shoots should be removed before they are 2 inches long.

Care of the growing crop.—To keep the tomato diseases in check, growers feel that it is necessary to spray the plants with arsenate of lead and Bordeaux mixture every ten days throughout their period of growth. Some tomato diseases can only be controlled by planting the seeds, and raising the plants in soil that has never produced tomatoes, and by transplanting the plants into a section of the garden that has not grown tomatoes. The state experiment stations are trying to produce a tomato that will be immune from disease.

For preparing and applying arsenate of lead and Bordeaux mixture consult "Control of garden insects."

To protect the plants from their insect enemies consult insect chart and insect control.

Handling the surplus.—"Steps in canning" will tell how to can tomatoes. "Marketing the surplus" will tell how to market tomatoes.



Tomatoes well pruned.

GROWING OF BEANS.

Fifth grade, Projects X, XV.
Sixth grade, Project XIV.
Seventh grade, Project XV.

Varieties.—The pole varieties yield more abundantly and for a longer period than the bush varieties. This is true of both the snap and the butter beans. For varieties see "Schedule."

Time to plant.—Beans can be planted in the garden as soon as all danger of frost is over and the soil is warm. To have a continuous supply of beans several different plantings should be made. For planting dates see "Schedule."

Planting.—The "Planting chart" will tell how to plant beans.

Care of the crop.—"Care of growing vegetables" will tell how to hoe, weed, and fertilize the crop as well as how to make the support for the running varieties. "Insect chart" will tell the insect enemies of the bean, and "Control of garden insects" will tell how to control these insects.

To check the spread of a disease called anthracnose that is common among beans the plants should never be disturbed when covered with dew or rain. This means neither pick the beans nor hoe between the rows. When the plant is disturbed the spores of this fungus easily float about in the dew and infect new areas in the plant.

Handling the surplus.—"Steps in canning" will tell how to can beans. "Marketing the surplus" will tell how to market the surplus.

GROWING OF SWEET POTATOES.

Fifth grade, Project XV.
Sixth grade, Project XII.
Seventh grade, Projects XIV, XV.

Advantages in raising sweet potato plants.—The chief advantage is in securing plants free from disease. This is done by bedding healthy seed potatoes in freshly prepared beds and placing the plants in a new patch. Sweet potato diseases are widespread, and all potatoes used for bedding should be carefully selected. Any potatoes showing diseased areas, or having wounds should be rejected.

Time to bed potatoes.—Bed in March and April for plants to put into the garden in May and June. Potatoes should be bedded from four to six weeks before it is time to put the plants into the garden.

Varieties.—See "Schedule."

Preparation of bed.—The size of the frame will depend upon the number of slips desired. It may be 8 inches high on the north side and 6 inches high on the south side. The excavation should be 8 to 16 inches deep, with a length and width corresponding to the inside measurements of the frame. The frame should be placed on top of the pit which is filled as follows: 4 to 12 inches of fresh horse manure thoroughly packed and watered, 4 inches of good garden soil, 3 inches of sand. Place the potatoes 1½ inches apart in the sand and cover with a layer of sand 4 inches deep and water the bed.

Care should be taken to secure manure that has had no diseased potatoes thrown upon it. The soil should be taken from the woods or from the garden where potatoes have not been grown.

Care of the bed.—The bed should be covered only on cold nights and during drenching rains. At all other times leave the beds open.

Preparation of the soil.—"Preparation of garden soil" will tell how to prepare the soil. Ridges are made by throwing two or three furrows together and leveling with a harrow. Wide ridges are preferred, for they do not dry out quickly. Just before the plants are set out top dress the soil on the ridges by an application of a high grade commercial fertilizer used at the rate of 4 pounds to 100 feet of ridge. This fertilizer should be mixed well into the soil.

Transplanting into the garden.—For distance apart of the plants see "Planting chart." For directions for transplanting see "Raising of vegetable plants." The plants should not be transplanted into the garden until all danger of frost is passed.

Care of the crop.—Until the vines begin to run, the soil should be hoed frequently enough to prevent the top soil forming a crust. Some gardeners turn the vines from one side of the row to the other to prevent them taking root.

Digging.—They should be dug in the fall before the frosts come. A sunny day should be selected when the soil is dry so the potatoes can be left out three or four hours after being dug. A spading fork can be used to dig them. Great care should be taken not to injure or bruise the potatoes.

Storing.—To keep well, sweet potatoes need to be kept in a warm, dry, well-ventilated place. They can be stored the day after they are dug. "Storage of vegetables" will tell how to construct and fill the pit. The variations are as follows: Build the pit on top of the soil and pack dry sand between the layers of potatoes. Provide extra ventilation by placing ventilating shafts at the bottom of the pit directly under the straw. The shaft can be made of boards and should extend through the bottom of the pit. The top board should have holes bored into it to let the air out into the pit. The end opening need not be over 6 by 6 inches, and should be protected with a screen. Allow one ventilating shaft to every 7 bushels of potatoes. If there are 15 bushels use 2 shafts. There should also be a ventilating shaft leading from the top of the potatoes through the straw. A 6 by 6 inch opening would be sufficient. The top of the shaft should be covered to keep out the rain and at the same time allow for circulation of air. When the weather gets cold the ventilators should be closed.

CARE OF GROWING VEGETABLES.

Fifth grade, Projects X, XI, XII, XIII, XIV, XV.

Sixth grade, Projects XI, XII, XIII, XIV, XV.

Seventh grade, Project XV.

To give the necessary attention to the growing vegetable crops the gardener should be familiar with the following garden activities: Fertilizing, thinning, weeding, hoeing, watering, spraying, staking, pruning, and blanching.

FERTILIZING.

Why should fertilizer be applied to the growing crop?—The plant food in commercial fertilizer is more quickly made available than the plant food in the soil or in stable manure. For this reason commercial fertilizer is used for all quick-growing crops, as vegetables. An application of fertilizer not only makes the vegetables form more quickly, but also prolongs the bearing period. Fertilizer applied to snap and butter beans will cause the plant to send out more blossoms and more pods will be produced.

When and how should fertilizer be applied to the growing crop?—Because fertilizer is so easily made available gardeners make two or three applications at intervals of two to three weeks during the growing period. Each application should be made at the rate of 3 pounds for every

100 feet of row. It should be spread thinly and near the plant, and should be hoed well into the soil. Care needs to be taken not to get any fertilizer on the leaves of the plants. No fertilizer should be applied to lettuce after it starts to head.

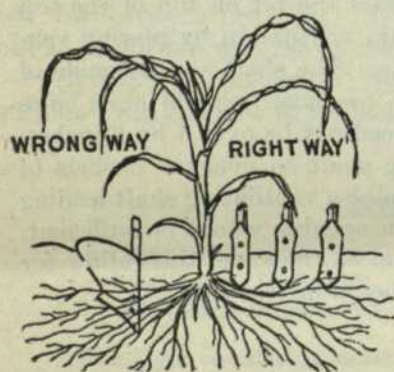
Kind to use.—The fertilizer used for tobacco plants is good. It is a high grade fertilizer.

THINNING.

When should thinning be done?—In order to insure a good stand most vegetable seeds are sown too thickly. This necessitates thinning when the plants are 1 inch high and again when they are 2 inches high. If thinning is done as soon after a rain as the soil can be worked the remaining plants will not be disturbed. These unnecessary plants if left in the row are as harmful to the growing crop as so many weeds in the row.

How much thinning should be done?—The amount of thinning will vary with the kind of vegetables. With root crops, such as turnips, carrots, parsnips, and salsify, the diameter of the fleshy root governs the distance apart to leave the plants. The plants should be left just far enough apart for the mature roots to touch. With plants like lettuce, mustard, and Swiss chard the size of the top governs the distance apart to leave the plants. The mature plants can touch each other. For distance apart of plants see "Planting chart."

What could be done with the plants that are taken out?—Beets, lettuce, mustard, and Swiss chard plants can be transplanted into new rows. Beet, turnip, mustard, lettuce, and Swiss chard plants can be cooked for greens. For principles of transplanting see "Raising of vegetable plants."



Wheel hoeing.

WEEDING.

Necessity.—To secure the best results a garden should be kept free of weeds. Weeds rob the vegetable plants of sunlight, air, moisture, and plant food and take up room that could be used for the growing of vegetables. They also serve as a substitute food plant for many of the garden insects as well as hibernating quarters.

When should the garden be weeded?—Every time the gardener goes into the garden he should do some weeding. The best time to kill the majority of the weeds is just as the young plants come through the soil. Wild morning glory can be completely controlled by persistently pulling up the young plants. The gardener should be continually on the watch, for young weed plants will be coming up throughout the growing season. Biennial weeds, with long roots, and weeds belonging to the grass family should be removed from the soil when the garden is being spaded or plowed. The gardener should give just as much time to removing these weeds as to pulverizing the garden soil. The grass roots should be put in a pile and burned.

HOEING.

Reasons.—Hoeing kills weeds, saves soil moisture for the growing crops, and insures a better supply of air. When the top soil is compact, soil water is lost by evaporation. Hoeing saves moisture by making the top soil loose and porous. This prevents the soil underneath drying out. Every gardener should learn the value of hoeing, for it increases the yield of a crop at least twofold. In many localities it would be far better to hoe a crop than to water it artificially. Occasionally gardeners use straw between rows of such crops as tomatoes. In such cases the straw is removed once in three weeks, the soil hoed, and the straw replaced.

How and when should the soil be hoed?—The upper 2½ inches of soil should be kept loose and dustlike. Hoeing should be shallow and level, otherwise the roots of the crop will be cut. A safe rule is never to allow a crust to form in the surface of the soil. A crust indicates that the soil moisture is coming to the surface, evaporating, and leaving the plant food on the top to cement the soil particles together. The soil should be hoed as soon as possible after every rain, after watering, and at least twice a week during a drought.

The practice of hoeing the rows of vegetables into ridges is to be condemned. The ridging process cuts off the roots of the vegetables and at the same time exposes more surface for evaporation.

A well hoed garden is never "laid by."

WATERING.

The usual method of watering a garden does more harm than good, for it simply packs the top soil and allows the soil water to reach the surface and evaporate.

How to water.—Remember that the roots of plants need the water and not the leaves. Practically all the water the plant requires is taken in through the roots. If the water is applied directly to the soil between the rows of crops, less water will be required and less time needed to do the work. Watering should be done as follows: Remove the nozzle from the hose, turn on the water, and draw the hose slowly down the rows. The amount of water applied should equal a long soaking rain. It should moisten the upper foot of soil. An occasional thorough application of water does far more good than a sprinkling each day. The intervals of watering will depend upon the rains and the mellowness of the garden soil. Overhead watering with a hose is a long and tedious process. It takes much time and water simply to wet the leaves.

To prevent the loss of water by evaporation the soil should be hoed after watering the same as after a rain.

SPRAYING.

Reasons.—If we do not protect our plants from insect enemies we need not expect to get a good crop, for the plant to grow well needs the work of each particular part—roots, stems, leaves, and blossoms. The roots take in food and moisture, which the stems convey through the plant. The leaves are the manufacturing parts, and the blossoms make the fruit. If we allow the potato bugs to eat the leaves of our potato plants, we need not expect to get potatoes, for the starch in the potato is made in the leaves.

When and how to spray.—Consult "Insect chart" and "Control of garden insects."

STAKING.

Garden peas, pole beans, and tomatoes need to be staked.

How is this done?—Brush can be stuck in the rows of garden peas for the vines to climb on. If a more permanent trellis is desired, chicken wire 4 feet wide can be used. Sticks woven through the wire every 4 feet and driven into the soil 1 foot will serve to hold the wire stiff and erect. At each end of the row the wire should be fastened to posts. After the crop is harvested, the vines should be removed and the wire with the sticks rolled up and stored in a dry place. The wire will then be ready to use another year. At first a little attention will be needed to train the vines in the wire.

A trellis for pole beans can be made as follows: Strong poles 6 feet long are driven into the soil at each end of the row. If the row is long, extra poles may be needed. Two wires are then stretched horizontally between the poles—one at the top and the other 4 inches from

the soil. String is then laced between the wires. At first the vines will need to be trained in the trellis.

For the staking of tomatoes see "Growing of tomatoes."

When should it be done?—For garden peas and pole beans the trellis should be put up before the crops are planted. The stakes or trellis should be in place before the tomatoes are transplanted into the garden.

PRUNING.

If tomatoes are trained to a stake or a trellis, they will require pruning. For directions of pruning, see "Growing of tomatoes."

Purpose.—Staking and pruning makes it possible to produce more and better quality tomatoes in a given area.

BLANCHING.

Celery and endive are the two garden vegetables that require blanching.

Purpose.—Blanching improves the flavor and makes the part tender and crisp.

How are the plants blanched?—Any device that will exclude the light will cause the stems and leaves of celery and endive plants to blanch.

There are two methods of blanching celery. One is with paper tubes and the other is with soil. Celery blanched with soil has a sweeter flavor than when blanched by other methods. Soil, however, can not be used for blanching early fall celery, as it has a tendency to cause the stalks to rust.

For this reason gardeners use paper tubes or boards for blanching the early crop and soil for the winter crop. Paper tubes can either be made or purchased. When the plants are about 15 inches high the tubes are placed about them so that only the leaves project. The tubes are held in place by soil drawn around the base. Six-inch tiles can be used in place of paper tubes. Some varieties of celery blanch so easily that 12-inch boards placed on each side of the row are all that are necessary. The bottoms of the boards are placed as closely as possible to the roots and the top edges are gradually drawn together until the boards are perpendicular. They are then held in place by driving in stakes.

If soil is used, care should be taken not to get any into the growing center of the plant. This can be done by holding the outside stems closely together with the hand, then drawing the soil around the plant until the stems are completely covered. Banking with soil should be started when the plants are about 8 inches high. As the plants grow, more earth is drawn around them. The plants should be completely covered when the cold weather comes.

"Storing of vegetables," will tell how to bank the winter celery.

Endive is blanched in two to three weeks. There are two methods in use. One is to draw the outside leaves together and tie them. The other method is to cover the plant with a fruit basket. It is best to blanch the plants as they are to be used.

CULTURAL METHODS OF GARDEN VEGETABLES.

Fifth grade, Projects III, X, XV, XVI.

Sixth grade, Projects IV, XII.

Seventh grade, Projects I, XV.

This course has covered cultural methods of all the more common vegetables. It would not be practicable to work out in detail the cultural methods of all the vegetables that could be grown in a home garden. But as some gardeners may wish to grow special vegetables, the following outline has been prepared to direct them where to find material for studying

the cultural methods of vegetables that could be grown, and have not been taken up in detail in these courses. Additional information may be secured from the following sources:

I. Leaflets of the United States Bureau of Education. These may be secured by writing to the Division of School and Home Gardening, Bureau of Education, Washington, D. C.

II. Farmers' Bulletins. These may be secured by writing to Mr. Joseph A. Arnold, Chief of the Division of Publication, Department of Agriculture, Washington, D. C.

III. Documents of the States Relations Service. These may be secured by applying to the office of extension work, Department of Agriculture, Washington, D. C.

IV. Bulletins of the State experiment stations. These will be sent on application to the director of the experiment station in any State. Through correspondence the State experiment station will assist you in solving special garden problems.

V. Bulletins of the National War Garden Commission. These may be secured on application to the National War Garden Commission, Maryland Building, Washington, D. C.

VI. Seed catalogues. Seed companies publish catalogues containing valuable information. The following are the names and addresses of a few companies: Peter Henderson Seed Co., 35 Cortland Street, New York, N. Y.; W. A. Burpee & Co., Philadelphia, Pa.; Tait & Sons, Norfolk, Va.; Wood & Sons, Richmond, Va.

First, send for the list of publications from each of these sources. Then study the list carefully and apply for only those bulletins that are vitally needed to help solve the present garden problems.

OUTLINE FOR STUDYING VEGETABLES.

A better crop can be produced if the gardener knows, before planting time, the soil requirements, cultural methods, and harvesting possibilities of each vegetable grown in the garden.

I. Name and variety of the vegetable to be planted: Consult "Planting calendar" and "Schedule."

II. Soil requirements: Consult "Preparation of garden soil."

III. Fertilizer requirements: Consult "Preparation of garden soil" and "Care of growing vegetables."

IV. Method of propagation—seeds, bulbs, or tubers.

V. Seasons of planting: Consult "Calendar," "Schedule," and "Raising vegetable plants."

VI. Methods of planting: Consult "Chart."

1. How far apart are the rows?

2. How far apart are the plants in the rows?

3. How deep is the seed, tuber, or plant planted?

4. How many seeds are needed for 100 feet of row?

VII. Location of the vegetable in the garden.

1. Is the vegetable sun loving in its habits?

2. Is the vegetable shade loving in its habits?

3. Will the vegetable shade or crowd other vegetables?

VIII. Care of the crop: Consult "Planting chart," "Care of growing vegetables," "Insect chart," and "Control of garden insects."

1. How often should the crop be cultivated?

2. What is the required distance of thinning for full development of the vegetable?

3. Does this vegetable need to be transplanted?

4. Does this vegetable need to be staked?

5. Does this vegetable need to be blanched?

6. Does this vegetable need to be sprayed?

(a) What is the purpose of the spray?

(b) What is the best spray to use?

(c) How often should the crop be sprayed?

IX. Harvesting: Consult "Planting chart," "Steps in canning," "Storing of vegetables," and "Marketing the surplus."

1. When should this vegetable mature?
2. How is it prepared for home use?
3. What is the canning possibility?
4. Is there a market demand for this vegetable?
 - (a) How should it be prepared for market?
 - (b) What price should it bring?
5. How is the fresh vegetable stored for winter use?

INSECT CHART.

Fifth grade, Projects X, XI, XIV, XV, XVI.

Sixth grade, Projects XII, XIV, XV, XVI.

Seventh grade, Project XV.

Insect enemy.	Vegetables injured.	When insect appears.	How recognized.	Method of injury.	Control.	Number of broods.
Colorado potato beetle.	Potato, tomato, pepper, Jamestown weed.	Early spring as soon as potato leaves come through the soil.	Yellowish red with black markings.	Eats leaves.....	Paris green or arsenate of lead.	Many.
Flea beetles....	Potato, tomato, egg plant, beet, spinach, turnip, cabbage, bean, okra, melon, cucumber, sweet potato.	April.....	Minute hopping beetles usually dark in color, occasionally striped.	Eat holes in leaves.....	.....do.....	Do.
Cutworms.....	Cabbage, tomato, pepper, corn, beans, sweet potato, cucumber, melon.	In spring when corn begins to sprout.	Hairless soft bodied worms varying in color from whitish to nearly black, frequently with markings.	Cuts off plant close to ground.	Bran mash, paper collar, hand pick.	Spring brood most destructive.
Imported cabbage worm.	Cabbage, collard, cauliflower, kale, and all other crops of mustard family, nasturtium, mignonette.	March.....	Adult—white butterfly with 1 or 2 black spots in forewing. Larvæ velvety green worm.	Eats leaves.....	Arsenate of lead.....	Many.
Southern cabbage worm.	Cabbage.....	May.....	Adult—resembles butterfly of imported cabbage worm. Larvæ striped, with black spots.	.....do.....	.....do.....	First brood most destructive.
Harlequin bug, known also as calico bug, collard bug, terrapin bug.	Cabbage, kale, collard, mustard, bean.	April.....	Black with red markings.	Sucks sap.....	Difficult. Hand pick, or trap crop of mustard, rape, kale. Kerosene emulsion.	Several.
Root maggots..	Cabbage, radish, onion, bean, cucumber.	.....do.....	Minute white worm...	Eats into stems below ground and into roots.	Sand and kerosene or tobacco.	Do.
Striped cucumber beetle.	Cucumber, squash melon, pumpkin.	.....do.....	Adult $\frac{3}{4}$ inch long with yellow and black stripes. Larvæ white.	Adult eats leaves and outer skin of the stem and fruit; larvæ, eats into stem just below ground. Adult spreads disease known as wilt.	Difficult. Plant early, cover plants until vines begin to run. For adults use arsenate of lead, for larvæ use sand and kerosene or tobacco.	Many.

Insect enemy.	Vegetables injured.	When insect appears.	How recognized.	Method of injury.	Control.	Number of broods.
Squash vine borer.	Cucumber, squash, pumpkin, melon.	May.....	White worm about 1 inch long when mature. Accumulation of yellow excrement on ground at place where larvæ are working in stems. Vine wilts.	Larvæ tunnels in stem.	Cut out borer; cover wound with soil; cover stem at joints with soil.	Two.
Melon worm...	Cucumber, melon, squash.	Throughout season.	Larvæ from yellowish to dull brownish green. Large quantities of soft excrement where larvæ tunnel into fruit.	Feed on leaves and stems. Eat into flower buds and into fruit.	As soon as buds begin to form spray plants with arsenate of lead. Bag fruit.	Three.
Tomato worm.	Tomato.....	June.....	Large green worm....	Eats leaves.....	Hand pick.....	Two.
Corn ear worm or tomato fruit worm.	Corn, beans, cornfield beans, tomato, pumpkin, squash, melon, pepper, okra.	July.....	Color of worm varies from a light pink to green and brown. Frequently with markings.	Worm bores into fruit and eats seed and pulp.	Difficult. Spray silk with arsenate of lead just as silk begins to appear. Bag tomato and squash.	Many.
Plant lice or aphid.	Garden peas, potato, tomato, egg plant, cabbage, melon, cucumber.	April.....	Minute pear-shaped insect; color varies: pale green, reddish, black. Frequently woolly.	Sucks sap from the most tender parts of plant leaves and stems.	Tobacco solution, to which soap solution has been added.	Do.
Weevils.....	Beans, peas.....	Throughout the growing season.	Adults minute, varying in color; brownish gray with markings. Larva, white.	Eat seed of growing crop and of stored crop.	Heat shell beans used for food, mix turpentine or snuff with seed stored for planting.	Do.

CONTROL OF GARDEN INSECTS.

Fifth grade, Projects X, XI, XIV.
 Sixth grade, Projects XII, XVI, XV, XVI.
 Seventh grade, Project XV.

SPRAYING.

Upon what does the success of spraying depend?—First, upon a knowledge of how the insect injures the plant. The gardener must know whether it eats the leaves, as the potato bug; or sucks the sap, as the harlequin bug and aphid; or feeds on roots, as the maggot; or cuts off the plant as the cutworm. The insects that feed on the surface of the plant and can be seen are much easier to control than those that feed inside the plant, or under cover, as the corn ear worm. Second, a thorough application of the right kind of spray at the right time. Sprays should be applied in a very fine mist and the entire plant should be completely covered with the spray mixture. The under surface of the leaves should be sprayed as carefully as the upper surface. The plants should be sprayed as soon as the insect appears. This early spray will kill the hibernating insects before they lay eggs, and so destroy the first brood. If the potato



Showing a class how to spray.

plants are sprayed as soon as the leaves come through the soil, the hibernating Colorado beetles will be killed when they eat their first meal and before they lay eggs. If the cabbage plants are sprayed as soon as the cabbage butterfly is seen flying over the plants, the larvæ of the cabbage butterfly will be killed before they injure the plants. Usually the early spring broods are so few in number that the gardener does not notice them in time to destroy them, and second broods are allowed to appear. These broods come in large enough numbers to injure the crop. If these are not destroyed the third brood that can completely destroy the crop will probably appear.



Section of potato plant showing Colorado potato beetle at work: a, Beetle; b, b, egg masses; c, c, half-grown larvæ; d, d, mature larvæ. (Somewhat enlarged.)

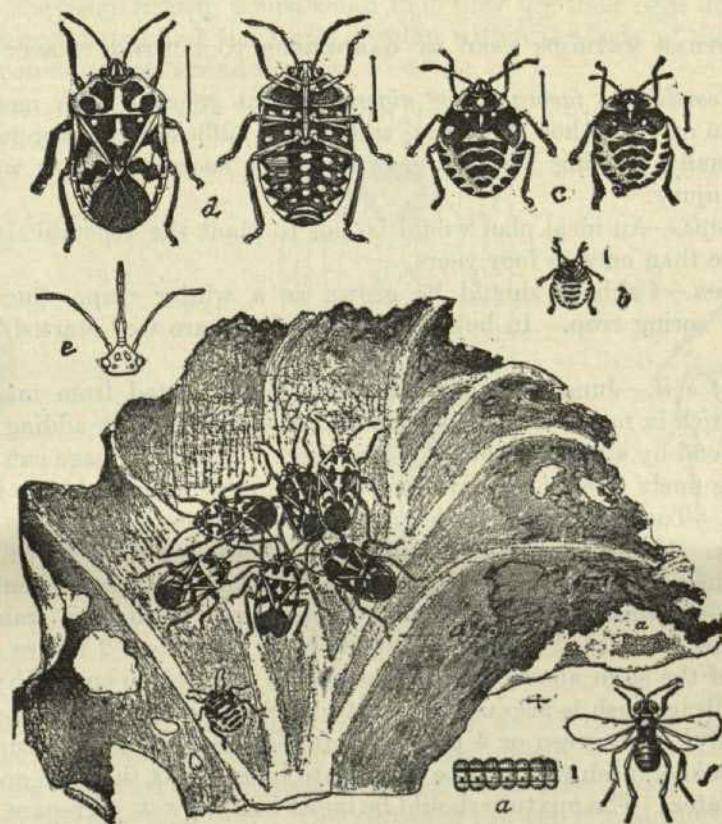
For chewing insects.—Use Paris green or arsenate of lead. Arsenate of lead sticks better and is not so likely to burn the leaves as Paris green. These sprays are applied either wet or dry. A wet spray is preferred for its sticks better and can be applied to the under side of the leaf.

The wet Paris green spray is made as follows: Mix 1 tablespoon of Paris green and 1 tablespoon of lime with enough water to make a thin paste, then add 1 gallon of water. The dry spray is made of 1 tablespoon of Paris green and 1 gallon of lime.

The wet arsenate of lead spray is made as follows: Mix 4 tablespoons of powdered arsenate of lead with enough water to make a paste then add to it 1 gallon of water. The dry spray is made of 4 tablespoons of arsenate of lead to 1 gallon of lime.

For sucking insects.—Tobacco solution and soap solution are used. A poison, sprayed on the surface of the plant, would not destroy sucking insects for they secure their food from the sap in the plant by inserting a sucking tube into the plant tissue. These insects are destroyed by covering their bodies with a spray material that will close up the breathing pores. There are a series of these breathing pores in each side of the insect's body.

A satisfactory tobacco spray is made as follows: Pour 1 gallon of hot water over 1 quart of tobacco stems. Let stand over night. Dilute to color of weak tea when used in spray, "Black Leaf 40" is used by many gardeners.



The harlequin cabbage bug: *a*, Eggs enlarged; *b*, nymphs, more enlarged; *d*, adults seen from above and below, enlarged; *e*, head and beak of same; *f*, parasite of eggs, enlarged. Bugs and eggs on leaf, natural size. (Courtesy of John Wiley & Sons, publishers, and E. W. Sanderson, author of "Insect Pests of Farm, Garden, and Orchard.")

A soap solution spray is made by dissolving 1 cubic inch of laundry soap in 1 quart of water.

For harlequin bugs.—Dissolve $\frac{1}{4}$ pound of hard soap in 2 quarts of water. Pour while boiling hot into 1 gallon of kerosene. *This should be done away from the fire.* Churn for 10 minutes. This makes a stock emulsion that will keep all summer. Mix 1 part of the stock emulsion with 15 parts of water for spraying. Apply in a fine mist so as not to soak the soil.

For heading cabbage.—Use a spray made of 1 tablespoon salt to 1 gallon of hot soapy water.

For biting insects on plants that have fruit ready to be eaten.—Steep 1 tablespoonful of hellebore in 1 pint of water and add 1 pint of cold water.

For plant diseases.—Bordeaux mixture is used to control some plant diseases. Frequently gardeners substitute 1 gallon of Bordeaux mixture for 1 gallon of water in making either a

Paris green spray or an arsenate of lead spray. In this way, the plants are protected from insect enemies and plant diseases by the same spray.

Bordeaux mixture is made as follows: Place 1 tablespoon bluestone in a porcelain dish and add 1 pint of water. Slack 2 tablespoons of stone lime until the lumps break up into a fine powder. Then add 1 pint of water and make milk of lime. When ready to use pour the dissolved bluestone and the milk of lime together into a wooden vessel or stone jar and stir with a stick. Never use metal. If as much as 3 gallons of Bordeaux mixture is needed use the following proportions: One-fourth pound of bluestone, one-half pound of stone lime, and 3 gallons of water.

OTHER METHODS USED BY GARDENERS TO CONTROL INSECTS.

Making soil conditions favorable for vigorous plant growth.—This means to thoroughly prepare the soil, to carefully hoe the crops, and to add sufficient commercial fertilizer to keep the plants continually growing. Plants growing under such conditions will resist a limited amount of insect injury.

Rotation of crops.—An ideal plan would be not to plant the vegetable in the same section of the garden more than once in four years.

Selecting season.—Cabbage should be grown as a winter crop. Cucumbers should be grown as an early spring crop. In both cases, the plants are well started before their insect enemies appear.

Preparation of soil.—June cabbage plants can be protected from maggots by planting seeds in a soil not rich in manure. Make the seed bed soil mellow by adding sand or coal ashes and supply plant food by adding commercial fertilizer. Winter cabbage can be protected from maggots by mixing finely ground tobacco stems into the soil where cabbage is to be planted.

Hand picking.—Tomato worms, harlequin bugs, and cucumber beetles are partially controlled in this way. If the gardener goes out early in the morning he will be likely to find cutworms within the upper 2 inches of soil around the plants that have been cut off.

Paper collars.—If when cabbage, tomato, and pepper plants are transplanted into the garden, paper collars are placed around the stems so as to protect 2 inches of the stem in the soil and 2 inches of the stem above the soil, the plants will not be cut off by the cutworms.

Bran mash.—Bran mash is also used for cutworms. It is made as follows: One quart of bran, 1 tablespoonful Paris green or 4 tablespoonfuls arsenate of lead, 1 cup of molasses, and enough water to make a mash that will be rolled into balls. Mix the bran and poison, then stir in the sweetened water. The mixture should be moist but not wet. Prepare at noon and apply at night, sparingly around base of plants.

Sand and kerosene.—This is used to prevent maggots. It is prepared as follows: Mix 2 tablespoonfuls kerosene in 1 gallon of dry sand. Apply sparingly about base of plants.

Covering plants.—To protect cucumber and melon plants from the striped cucumber beetle, the plants should be covered with cheesecloth until the vines begin to run. To protect June cabbage plants from cabbage maggot, cover the seed bed with cheesecloth.

Cutting out.—Squash borer is practically controlled by locating the worm in the stem, and then making a longitudinal cut from which the worm may be drawn out. Always cover the wound with earth.

Trap crops.—Harlequin bugs, squash bugs, striped cucumber beetles, and maggots are sometimes attracted from the main crop by planting a trap crop between the rows. The trap crop is some other plant that furnishes food for the insect. The insect is then destroyed by spraying the trap crop with a spray too strong for the main crop.

Fall cleaning up of the garden.—As soon as a crop is harvested the remnants should be either burned or put in the compost pile. All weeds should be pulled up and put on the compost pile. Weeds serve not only as substitute food plants for garden insects, but they also furnish hibernating quarters for such insects, as the cabbage butterfly, plant lice, harlequin bug.

METHODS USED BY NATURE TO KEEP INSECTS UNDER CONTROL.

Fungi and bacteria.—Diseases caused by fungi and bacteria kill many insects, such as the house fly, grasshopper, and squash bug.

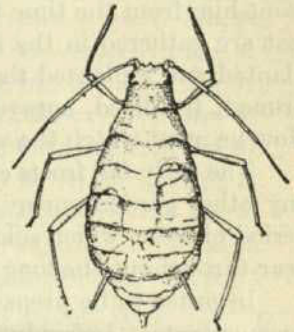
Parasitic insects.—Some insects are so small that they lay their eggs inside the bodies of other insects. The eggs hatch and the larvæ develop within the body of the host. An insect that is parasitized can not reach the adult stage.



Winged female aphid parasitized.



Dead aphid, showing hole from which the matured parasite emerged. The top picture shows the lid still attached, but pushed back; the bottom figure shows the parasite emerging. (Much enlarged.)



Wingless female aphid containing larva of a parasite. (Much enlarged.)

Predacious insects.—Wasps, lady bugs, tiger beetles, devil's riding horse, dragon flies are only a few of the many insects that feed entirely on other insects.

Spiders.—Spiders use various methods to catch their insect food. The web weaving spiders build webs to entangle their prey. One thread of the web is made inelastic and the other thread is made sticky and elastic. Some of the crab spiders are brightly colored and conceal themselves in flowers where they wait for their prey. The insect visiting the flower gets within reach of the spider without seeing it. The running spiders depend upon their legs to catch insects, and granddaddy longlegs pounces on an insect in the same way as a cat does on a mouse.

Snakes and lizards.—Both of these animals feed on insects.

Toad.—Every gardener should have a toad to help control insects. The toad's tongue is especially made for catching insects. It is estimated that a good sized toad will destroy nearly 200 insects during a single night. During the daytime toads seek shelter in a moist cool place and come out in the cool of the evening to feed. This is not only because the toad is a shy animal, but also because the bright warm sun injures his skin.

Birds.—In 4 hours and 32 minutes a mother wren made 110 visits to her little ones and fed them 111 insects and spiders. The food of so many birds consists largely of insects, that the economic value of the birds of the United States amounts to many millions of dollars each year.

Aside from their economic importance, birds should be protected because of the joy they bring into human life.

Bats.—Bats, like toads, are busy during the evenings and nights, catching their insect food.

Rain and snow.—Rain and snow first freezing on plants and then melting, break up and wash away many insects eggs laid on the branches and stems of the plants.

PROTECTING THE SUMMER VEGETABLES FROM THE EARLY FALL FROSTS.

Fifth grade, Project XV.

Sixth grade, Project XII.

Seventh grade, Project XV.

In bringing the garden to its fullest productivity, the early fall frost is the last problem the gardener has to consider. In order to provide the vegetables with all the conditions necessary for a vigorous growth, the gardener has had to solve, one by one, the problems which confront him from the time the first vegetables come through the soil in the early spring until the last are gathered in the fall. He has thoroughly prepared the soil; purchased selected seeds; planted and replanted the garden to utilize every square foot of space; hoed, weeded, thinned, pruned, fertilized, sprayed, and watered to keep the plants growing and in good condition. Now he must watch the weather reports and protect the vegetables from freezing.

The early fall frosts collect their portion of toll from the garden profits in the same way as any other garden enemy, but if the gardener will protect the plants through this first short period of frost, which seldom lasts more than one or two nights, the vegetables will continue to bear throughout the long period of warm fall days following the first frost.

In order to be prepared for this early frost period, the gardener should provide coverings for his plants. Individual plants may be protected by pinning newspapers over them. Tomatoes and pole beans growing on trellises may be protected by hanging cheesecloth, sacking material, and the like over the trellis. Sections of the garden containing the most tender vegetables, such as snap beans, potatoes, cucumbers, etc., should be inclosed with a board frame over which cheesecloth can be stretched during chilly nights when there seems danger from frost. These coverings should be removed the next morning as soon as the sun has warmed the air.

Flowers should be given the same protection as vegetables.

If preferred the entire section of the garden in which tender vegetables are growing can be protected from frost by making a heavy smoke which will hold warm soil air close to the plants and exclude cold air. These smoky fires or smudges are made by keeping ordinary fires partially smothered by grass cuttings, etc.

Another method of making smudges is to place cans holding a gallon of crude oil each about 10 feet apart in the garden, and when the thermometer in the coldest section of the garden registers near the freezing point to pour a tablespoonful of gasoline on top of the oil in each can and ignite. As gasoline is very volatile and inflammable great care should be used in handling it. None at all should be spilled, and the vessel from which it is poured should be removed to a safe distance before the cans are lighted. The lighting should be done carefully with a long handled torch. If lighted in this way the crude oil which should cost only about 7 cents a gallon will burn five or six hours.

These "smudge cans" need be placed only where the tender vegetables are growing. Vegetables, such as onions, beets, cabbage, turnips, lettuce, and celery, will not be injured by early frosts.

If it is not possible to use smudges then sprinkle or wet the plants thoroughly by some overhead watering device when the thermometer nears the freezing point. This will protect the vegetables from frost.

Semitender vegetables, even if frosted, may be saved by sprinkling them before the sun comes up.

During this frost period, the gardener should continually watch the weather reports in local papers. The following chart, compiled by the United States Weather Bureau, at Richmond, Va., and Raleigh, N. C., will be very helpful:

Frost data.

Cities.	Earliest date of killing frost in autumn.	Average date of first killing frost in autumn.	Latest date of killing frost in spring.	Average date of last killing frost in spring.
Lynchburg.....	Oct. 2.....	Oct. 27.....	May 17.....	Apr. 24.
Asheville.....	Oct. 3.....	Oct. 13.....	May 10.....	May 10.
Chapel Hill.....	Oct. 1.....	Oct. 29.....	May 10.....	Apr. 7.
Charlotte.....	Oct. 8.....	Nov. 4.....	Apr. 26.....	Mar. 29.
Goldsboro.....	Oct. 12.....	Oct. 30.....	Apr. 22.....	Apr. 4.
Greensboro.....	Oct. 11.....	Oct. 25.....	Apr. 26.....	Apr. 7.
Kinston.....	Oct. 12.....	Oct. 29.....	Apr. 26.....	Apr. 6.
Raleigh.....	Oct. 8.....	Nov. 2.....	May 6.....	Mar. 31.
Reidsville.....	Oct. 2.....	Oct. 22.....	May 10.....	Apr. 13.
Salisbury.....	Oct. 3.....	Oct. 21.....	May 15.....	Apr. 9.
Wilmington.....	Oct. 16.....	Nov. 13.....	May 1.....	Mar. 23.
Winston-Salem.....	Oct. 2.....	Oct. 23.....	May 15.....	Apr. 15.

STEPS IN CANNING.

Fifth grade, Project XVII.

Sixth grade, Projects XIV, XV.

Seventh grade, Project XVI.

All surplus summer vegetables that can not be dried should be canned. Vegetables keep best when canned in spring-top jars.

- I. Test jars to see that they are free from leaks. To do so, fill jar three-fourths full of water, put on rubber, screw on top, and invert.
- II. Wash jars and lids in hot soapy water. If jars have been used before, put a teaspoon-full of baking soda in each, fill with warm water, and let it stand for half an hour.
- III. All utensils should be ready to use before vegetables are gathered.
- IV. Select for canning purposes those fruits and vegetables that are best suited to cooking. They should be fresh, crisp, and free from decay, and as nearly uniform in size, color, and ripeness as can be obtained. They should be canned as soon after picking as possible. The rule is "one hour from the garden to the can."
- V. Wash the vegetables and fruit carefully.
- VI. From here on the directions change with the vegetable or fruit to be canned.

A. Tomatoes—

1. Put the tomatoes into boiling water for one minute. This makes them peel easier.
2. Remove skins.
3. Cut up as if they were to be cooked, or, if preferred, they may be canned whole. If canned whole, remove all hard core.
4. Fill the jars to within 1 inch of the top. Add to each quart a level teaspoonful of salt. Do not use water, juice is sufficient.

5. Carefully clean rim to remove all juice and seeds.
6. Place rubbers and cover on jar and partially seal. Use new Good Luck rubbers that have just been boiled for one minute.
7. Place on rack in a boiler. A good rack may be made of slats.
8. Fill boiler with enough water to come to within 2 inches of top of jar.
9. Cover boiler.
10. Bring to a boil, then boil for 20 minutes.
11. Remove jars, tighten lids, and invert to cool. Do not place jars in a draft nor on a hard cold surface.



Learning to can vegetables and fruit in the school kitchen.

Fruit, such as peaches, pears, plums, apples, and berries, may be canned the same as tomatoes, except a hot sirup is used instead of salt. The sirup may be made as follows:

- 2 cups water.
- 1 cup sugar.

The length of time for cooking also varies. It depends upon the kind and ripeness of the fruit.

- Berries, 15 minutes.
- Plums, 20 minutes.
- Apples, 20 minutes.
- Peaches, 30 minutes.
- Pears, 40 minutes.

Tomatoes, peaches, pears, plums, apples, and berries may be canned by the open pot method, and put while hot into hot clean jars. Place on rubber, seal and invert to cool.

B. Beans—

1. Snap or cut the beans the same as for cooking. If beans are very young and tender they may be canned whole.
2. Put into a cheesecloth square, wire basket, or thin muslin bag, and lower into boiling water for 10 minutes. This is to shrink the beans so more can be put into the jars.
3. Plunge into cold water for half a minute.
4. Put the beans into jars, filling to within 1 inch of the top. Add one level teaspoonful of salt to each quart, and fill to within 1 inch of top with water the same temperature as that into which the jars are to be placed.
5. Clean rim of jar carefully.
6. Place rubber on jar and partially seal. Use new Good Luck rubbers that have just been boiled for one minute.
7. Place in boiler on rack made of slats.
8. Fill boiler with enough water to come to within 2 inches of top of jars.
9. Cover boiler.
10. Bring water to a boil. Boil for one hour on each of three successive days. The covers should be tightened after the boiling has been finished the first day, and should not be opened again.



This canning outfit owned by the school is loaned to the school gardeners for preserving their surplus.

MARKETING THE SURPLUS.

Seventh grade, Project XVI.

The garden should be planned, first, to supply the family with a variety of fresh vegetables throughout the gardening season, and, secondly, to provide for additional rows that can be canned, stored, or left in the garden for winter use. The remaining space can be planted in crops to market. The variety of these crops and the quantity to plant will depend upon whether the vegetables are to be sold to neighbors or to local dealers. Before a selection is made the gardener should consult the neighbors, or the local dealers, and find out what vegetables would be purchased and the amount of each.

Grading and displaying the vegetables attractively are essential to all successful marketing. A high quality of vegetable, carefully packed in a clean basket of suitable size and shape will attract the eye of the customer. It will also insure a future market. Remember that fresh vegetables wither very quickly and should be marketed as soon as possible after they are gathered.

The vegetables should be graded with reference to size, shape, color, and degree of ripeness. They should be clean, fresh, and free of any blemish or bruise. Tomatoes, for instance, should be wiped, and only those of the same size, shape, color, and the same degree of ripeness should be packed together. One overripe, leaking tomato will take away the attractiveness of the entire basket.

Do not mix large and medium sized beans together, but instead place the large beans in one pile and the medium ones in another. Sell the large beans to the customers who wish large beans, and the medium ones to the customers who wish this kind. Beans graded like this will require the same amount of time for cooking. Butter beans should be graded in the same way. Corn should be graded as to size of ears and degree of ripeness. Some customers will want the corn while the kernels are in the early milk stage, while others will want corn when the milk in the kernels begins to thicken.

Beets should be graded first as to shape, then as to size. All beets that are bruised, irregular in shape, or that have deep furrows filled with little roots should be discarded. The remaining ones should be grouped as follows: Place all those that are 2 inches in diameter in



Successful marketing depends upon carefully grading and attractively displaying the vegetables.

one pile, those 3 inches in another, and those still larger in a third pile. The beets should then be washed and bunched. There will be customers who will wish each of these grades of beets. Beets 2 inches in diameter are preferred in most markets. Other root crops, such as radish, turnips, carrots, and parsnips should be graded, in the same way. Irish potatoes and sweet potatoes should be graded, but not washed.

Onions are marketed in either the green or the mature stage. Green onions are sold in bunches. As the onions are being bunched the outer skins are removed and all but 4 inches of the tops is cut off. Usually there are four to six onions of about the same size in each bunch. Mature onions should be graded into large, medium, and small sizes.

It would be well for the gardeners who have vegetables regularly to sell to have a definite time to take orders and to deliver the vegetables. In some cities a group of gardeners rent a stand in the market for certain days in the week. The members take turns in selling the vegetables on the market days.

The art of marketing requires as much skill as the art of producing. Every gardener should learn how to market his surplus to get the greatest net returns. The keynote in marketing is to satisfy the customer, so that more will be purchased.

STORAGE OF VEGETABLES.

Seventh grade, Project II.

Lettuce.—As soon as lettuce growing in the open has headed, it freezes very easily and for this reason will need to be covered with a layer of straw 6 inches deep during freezing weather. On warm days, the straw should be removed.

Endive.—Endive will stand more cold than lettuce. During freezing weather, however, endive should be covered the same as lettuce.

Celery.—Celery, like lettuce, is killed easily during freezing weather. Soil should be banked around the plants and the tops covered with straw or corn stalks until all the leaves are hidden. The straw should then be covered with soil and protected by a roof made of boards. Winter varieties of celery keep better than the fall varieties.

Cabbage.—Make a well-drained trench 1 foot deep and line with 4 inches of straw. Place the entire cabbage plant head down in the trench and completely cover with straw. The straw should be completely covered with soil which should be banked up to shed water.

Beets or turnips.—Only perfect roots should be stored. Those that are bruised or injured should be discarded. As soon as the roots are pulled, the leaves should be cut off 1 inch from the roots, and the roots stored.

Dig a circular pit 2 to 3 inches deep, line with straw, and place the vegetables in a cone-shaped pile. The vegetables may be separated by layers of sand, arranging the cone with first a layer of vegetables and a layer of sand and repeat. Cover the vegetables with several inches of straw and then cover the straw with soil. Allow the straw to extend through the top of the cone to insure ventilation. To prevent rain coming through the straw ventilator place a board over the top of the pit and weight down with a stone. As the weather becomes colder add more soil. Make a ditch all around the pit.

Only one kind of vegetable should be placed in the pit.

THE STRAWBERRY BED.

Sixth grade, Project IX.

Varieties.—Missionary or Klondike for earliest berries; Aroma for the medium crop, and Granda for the late berries.

Time to plant.—March.

Securing the plants.—Plants may be secured from the following nurseries: W. F. Allen Co., Salisbury, Md.; E. W. Johnson, Salisbury, Md.; L. C. Lingle, Pittsburg, Md.; Continental Plant Co., Kittrell, N. C.; Hastings Nursery Co., Atlanta, Ga.

Age of plants.—One-year old plants give the best results.

Preparation of soil.—Strawberries grow in many kinds of soil. Any good, well-drained garden soil, well prepared, will produce strawberries. A layer, 1 inch deep, of well-rotted manure should first be thoroughly spaded into the soil. Then finely ground bone meal at the rate of 1 pound to 25 square feet of space, and tobacco stems at the rate of 3 pounds to the same space should be carefully raked into the soil. Wood ashes spread over the soil just thick enough to be seen can be used in place of bone meal and tobacco stems.

Setting the plants.—The rows should be 2 feet apart and the plants 1 foot apart in the rows. The holes should be deep enough to place the plants at the same depth they were before and large enough to spread the roots out well. In transplanting the soil should be placed a little at a time around the roots and pressed down firmly. Care should be taken not to get any soil in the crown.

Care of the bed.—Clean culture is of prime importance. The strawberry bed should be hoed frequently so as to keep the bed free of weeds and the upper two and one-half inches of soil loose and dustlike. Throughout the first summer all lower stems should be removed as soon as they appear. The runners should be cut off. The cut should be made as close to the plant as possible. To prevent rain from splattering sand and soil on the fruit, a thin layer of straw or pine needles

should be spread over and between the rows in December. This layer should be thin enough for the plants to grow through it the following spring.

Harvesting.—A strawberry bed carefully prepared and cared for should produce at the rate of a quart of berries to the plant the following season.

GROWING OF RASPBERRIES, BLACKBERRIES, AND DEWBERRIES.

Varieties.—Red raspberries—Cuthbert, St. Regis, or Cardinal. Black raspberries—Cumberland, Kansas, or Greggs. Blackberries—Early Harvest or Eldorado. Dewberries—Lucretia or Austin.

Time of planting.—March.

Securing the plants.—The plants cost from 5 to 15 cents if purchased from nurseries. (See nurseries listed in "The strawberry bed".) Any neighbor growing these plants would have quantities of plants to give away. Such plants, however, should be carefully inspected to see that they are free of disease.

Location in the garden.—The plants do well in a cool shady section of the garden. They could be planted next to the fence, or in corners not used for the growing of vegetable crops.

Preparation of the soil.—Like strawberries these fruits grow best in well drained, carefully prepared garden soil. For preparation of soil consult "Preparation of the garden for planting," and "The strawberry bed."

Setting the plants.—The rows should be 4 feet apart, and the plants placed 3 feet apart in the rows. The plants grow rapidly and would soon crowd if placed closer together. The holes should be large enough to spread the roots out well and should contain rich mellow soil to induce new root growth. Any bruised section of the root should be cut off as nearly horizontal as possible with a sharp knife. The plants should be set 3 to 4 inches deeper than they had previously been. The soil should be pressed firmly about the roots. As the new sprouts form, the soil should be pulled toward the plant until the hole is completely filled.

Care of the patch.—The patch should be hoed frequently to save moisture and to kill weeds. Shoots called suckers, which sprout from the roots of red raspberries and blackberries, must be kept under control, or the patch will in time become a dense thicket and the fruit will decrease in quantity and quality and will be hard to pick. The rows should be kept 8 to 10 inches wide.

The patch should receive a light application of stable manure or commercial fertilizer each year. It is a mistake to think these berries require no fertilizer. Immediately after the fruit is gathered, the canes that have borne fruit should be cut out and burned. These old canes are of no value to the plant and are likely to harbor insects and fungous diseases. In the spring red raspberries are pruned as follows: The weak canes are cut out and the strong ones are cut back to 4 feet. During the early part of the summer black raspberries and blackberries are pruned as follows: The tops of the new canes are cut back 2 inches when the canes are 3 feet high. This is done to make the canes branch. A branched cane will produce more fruit than a straight cane. Since all the new canes will not reach the desired height at the same time, the patch must be gone over more than once. The canes should be thinned out to 5 canes to each plant. Very little pruning is required for dewberries.

Propagating.—Red raspberries and blackberries send up shoots from the horizontal roots. These shoots make new plants and can be transplanted into new rows in the garden in September. In digging up the plants care should be taken to remove a part of the horizontal root.

If the tips of the long canes of black raspberries and dewberries are covered with mellow soil the last of August, they will take root and produce new plants that could be transplanted into rows in the garden the following spring.

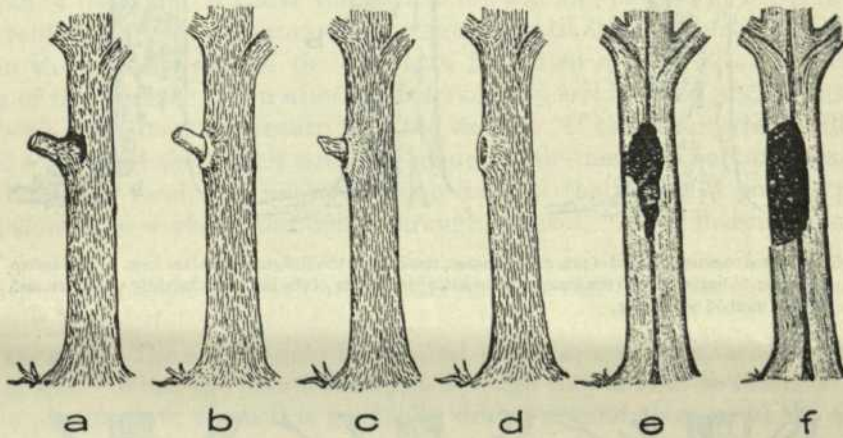
Diseases.—These fruits have a number of diseases and insect enemies. These can be partially controlled by cutting out and burning all the old canes and any new canes that are diseased. Spraying with Bordeaux mixture is also practical. The first application should be made when the new canes are 6 inches high. A second and third application should be made at intervals of 10 to 14 days. "Control of garden insects" will tell how to make Bordeaux mixture.

Harvesting.—Berry patches carefully cared for should bear for 10 to 15 years.

PRUNING OF FLOWERING SHRUBS, VINES, AND MATURE TREES.

Seventh grade, Projects IX, X.

Pruning of flowering shrubs and vines.—The shrubs and vines used in the front yard to beautify the home require very little pruning. Dead, broken, or rubbing branches are all that need to be removed. Shrubs, however, that are used to supply flowers should be severely pruned. This will induce the plant to send out many branches on which flowers will be borne.



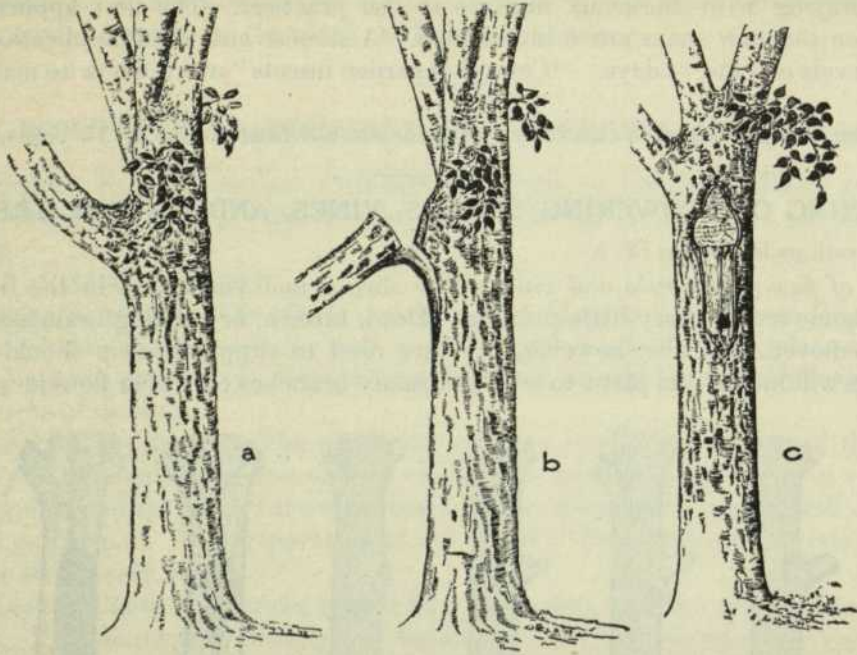
Showing the evolution of a cavity and method of treating the same: a, Large stub left from pruning; b, beginning of decay; c, more advanced stage; d, cavity formed in the wood; e, longitudinal section of the trunk showing cavity; f, cavity cleaned out and filled with cement.

Time to prune flowering shrubs and vines.—Spring flowering shrubs, such as forsythia (yellow bells), should be pruned immediately after blooming, for the blossoms for the following spring are formed during the plant's summer growth. Summer and fall flowering shrubs, such as roses, should be pruned in the early spring before the buds open, for the season's blossoms are borne in the new wood grown during the spring. In each case a severe pruning causes the plant to send up more blossom-bearing branches.

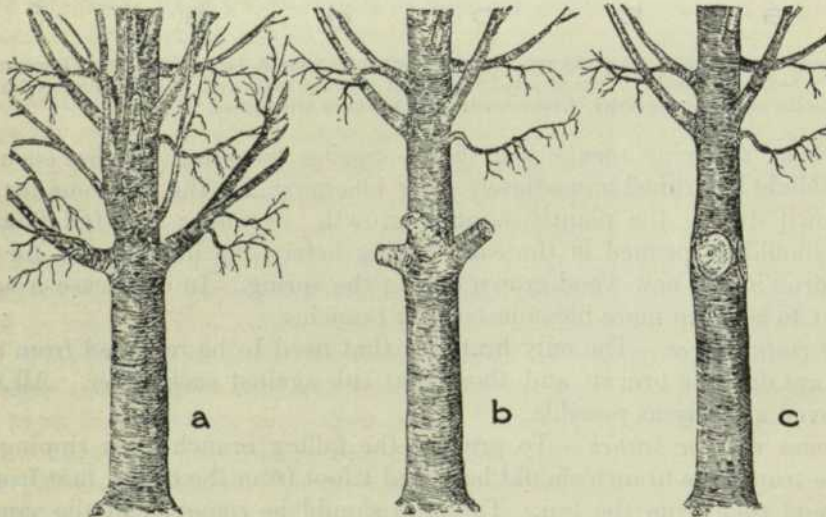
Pruning of mature trees.—The only branches that need to be removed from a mature tree are those that are dead or broken and those that rub against each other. All water sprouts should be removed as early as possible.

How to remove a large branch.—To prevent the falling branch from ripping off the bark and wood of the trunk, the branch should be sawed 1 foot from the trunk, first from the bottom to the center, and then from the top. The stub should be removed in the same way. The cut should be made close and parallel to the trunk. If the wound is large, it should be covered with zinc. The zinc should be made the same size as the wood portion of the wound. This will enable the growing section between the bark and the wood to cover the zinc.

Time to prune mature trees.—Mature trees can be pruned at any time. If done in the spring the wound will heal more quickly.



Showing too common method of pruning branches, resulting in the disfiguration of the tree: a, Tree before pruning; b, branch cut in the wrong way resulting in peeling of the bark; c, unsightly wound caused by this method of pruning.



Showing the proper method of pruning large branches: a, Tree before pruning; b, showing relative distance of first cut from the tree trunk; c, the same with branch cut close.

RAISING SWEET PEAS.

Seventh grade, Project IV.

Varieties.—First choice, Spencer varieties; second choice, orchid flowered mixed. Henry Dreer Seed Co., Philadelphia, Pa., makes a speciality of these seeds.

Time to plant.—Sweet peas may be planted in the fall and protected with a muslin cover through the winter, or they may be planted early in the spring—February, if possible. An effort should be made to plant the seed early enough to enable the roots to become well established in the soil before there is much growth of the tops. The light seeded varieties are not so robust as the dark seeded ones, and for this reason should not be planted until the ground is comparatively warm and dry.

Location.—Sweet peas should be planted in a warm, sunny, well-drained section of the vegetable garden.

Preparation of the trench.—To blossom well, sweet peas need a deep, rich loam. This means a soil made up of about equal parts of sand, clay, and organic matter. Line off a trench 15 inches wide, the length of the row. Remove the mellow top soil and place it at one side of the trench, to be used in refilling. Continue removing the subsoil until the trench is 20 inches deep. Pile this subsoil on the opposite side of the trench to be carted away. Place 4 inches of cinders at the bottom of the trench. Then after the reserved top soil has had worked into it one-third of its bulk of well-rotted manure, return it to the trench. If this returned soil still seems heavy, add sand also. Then fill the trench with soil made of one-third top soil, one-third well-rotted manure, and one-third sand. In addition, bone meal at the rate of 8 pounds per every 100 feet of trench should be worked thoroughly through the soil. This filled-in soil should be well firmed.

Blossoms for exhibition purposes are produced on a soil that has been trenched $2\frac{1}{2}$ to 3 feet deep.

Planting the seed.—The seed should be planted 1 inch apart and 4 inches deep and covered with 2 inches of soil. When the plants are $1\frac{1}{2}$ inches high they should be thinned out to 2 inches apart. As the plants grow, the soil is gradually drawn around them until the trench is completely filled.

Care of the plants.—When the plants are 8 inches high, top dress the soil with a high-grade fertilizer such as is used by tobacco growers. This fertilizer should be applied at the rate of 2 pounds for 100 feet of trench. Similar applications should be made when the buds begin to appear, and again at the height of the blossoming period. The top soil should be kept well hoed. During droughts, the soil should be watered thoroughly. To prolong the blossoming period the blossoms should be picked regularly. A trellis made of poultry wire is satisfactory and can be used year after year.

FLOWER GROWING.

Fifth grade, Project VIII.

Sixth grade, Projects II, VIII, XIX.

Seventh grade, Projects V, VI, VII.

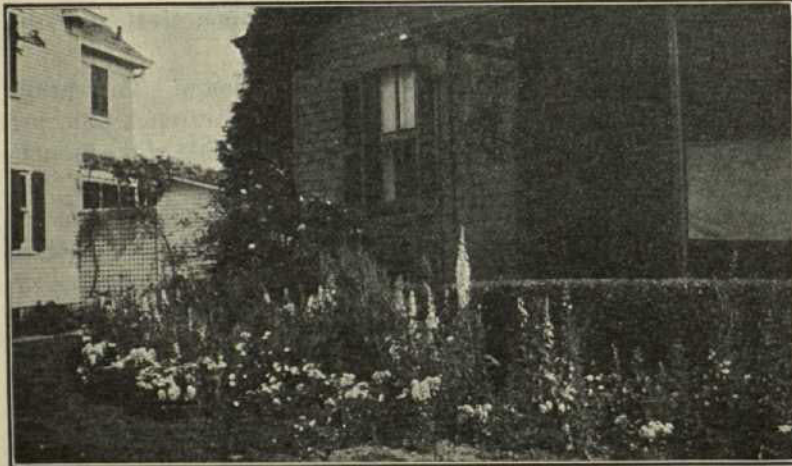
FLOWER BORDERS.

Location.—The flower borders should be located against the fences and close up against the sunny sides of the house. The center of the lawn should be free of any round flower beds.

Preparation of soil.—To grow well, flowers need a deep, mellow, rich soil. In order to secure these conditions a trench should be made the length and width of the border and at least 15 inches deep. In spading the soil the bottom 5 inches should be thrown one side to be

carried away and the remaining soil mixed with a 1-foot layer of well-rotted manure or compost.

Planning the border.—The attractiveness as well as the usefulness of the flower border depends upon the choice and arrangement of flowers. The flowers should be chosen as to height of plants, color of blooms, and seasons of blooming. The tallest flowers should be placed at the back of the border. For a border 6 feet wide none of the plants need be over 5 feet high. There can be a riot of colors if the flowers are arranged in clumps of two or three throughout the entire length of the border and if white flowers are used freely between shades that clash. In well-planned flower borders some flowers should be in bloom every



Flowers well placed make the home more attractive. (Courtesy of "The Southern Workman.")

month during the growing season. A surprisingly large number of individual plants of each variety will be needed. During the first year the borders may be made most attractive with annuals alone. After the first year hardy perennials might predominate with enough annual flowers to fill up the spaces and hide the soil. The following well-tried, old-fashioned flowers will give the best results:

Annual flowers.—Alyssum, African daisy, annual phlox,

aster, calendula, calliopsis, candy tuft, corn-flower, cosmos, larkspur, nigella, marigold, nasturtium, petunia, stock, sunflower ("cut-and-come-again" variety), zinnia.

Hardy perennials.—Canterbury bells, canna, hardy carnations, chrysanthemum, columbine, coreopsis, crocus, daffodil, dahlia, delphinium, foxglove, gaillardia, gladiolus, golden glow, hollyhock, iris, lily, oriental poppy, peony, phlox, pink, platycodon, tulip, scabiosa, shasta daisy, snapdragon, stock, sweet William, wallflower, verbena, violet.

Flower chart.

Flowers.	Height of plant.	Color of bloom.	Season of blooming.
Alyssum.....	2 to 4 inches.....	White.....	May to October.
Phlox (annual).....	1½ feet.....	White, pink, salmon, scarlet, yellow.....	June to October.
Aster.....	1½ feet.....	White, pink, purple.....	August, October.
Calendula.....	1 foot.....	Yellow, orange.....	June to October.
Calliopsis.....	2 to 3 feet.....	Crimson, yellow, orange.....	June to August.
Cornflower.....	1½ feet.....	Blue, white, pink.....	May to July.
Cosmos.....	5 feet.....	White, pink, rose, crimson, yellow.....	October, November.
Larkspur.....	2 feet.....	Blue, pink, rose, white.....	May, June.
Marigold.....	1 to 2 feet.....	Yellow, orange.....	June to October.
Nasturtium.....	1 to 4 feet.....	Yellow, white, crimson.....	May to October.
Petunia.....	1½ feet.....	White, pink, red, lavender.....	May to October.
Stock.....	1½ feet.....	Blue, yellow, scarlet, white.....	June.

Flower chart—Continued.

Flowers.	Height of plant.	Color of bloom.	Season of blooming.
Cut-and-come-again sunflower.	4 feet.....	Yellow.....	June to October.
Zinnia.....	1 to 2 feet.....	Yellow, white, orange, rose.....	July to October.
Canterbury bells.....	2½ feet.....	Rose, white, blue.....	May, June.
Canna.....	4 feet.....	White, yellow, red.....	July to October.
Hardy carnations.....	1 foot.....	Red, white.....	June to October.
Chrysanthemum.....	1 to 3 feet.....	White, yellow, pink, red.....	September to November.
Columbine.....	1 to 2 feet.....	Yellow, white, pink, blue.....	May, June.
Coreopsis.....	2 feet.....	Yellow.....	May, June.
Crocus.....	3 inches.....	White, yellow, blue.....	February, March.
Daffodil.....	1 foot.....	Yellow.....	February to April.
Dahlia.....	3 to 4 feet.....	Yellow, red, pink.....	August, September.
Delphinium.....	15 inches to 4 feet.	Blue.....	May, June.
Foxglove.....	3 feet.....	White, yellow, purple, red.....	May, June.
Gaillardia.....	1 to 2 feet.....	Crimson, yellow, orange.....	May to October.
Gladiolus.....	2½ feet.....	Pink, scarlet, yellow, white, violet.....	June to September.
Golden glow.....	6 feet.....	Yellow.....	August to September.
Hollyhock.....	5 to 8 feet.....	Yellow, pink, white, crimson, lavender.....	June, July.
Iris.....	2 feet.....	White, yellow, purple.....	May.
Day lily.....	3 feet.....	Yellow.....	June, July.
Oriental poppy.....	2 to 3 feet.....	Scarlet, white, yellow.....	June to September.
Peony.....	3 feet.....	White, pink, red.....	May.
Phlox (hardy).....	3 feet.....	White, pink, scarlet, salmon, yellow.....	June to October.
Pink (hardy).....	1 foot.....	Pink, scarlet, violet.....	May, June.
Platycodon.....	1½ feet.....	White, blue.....	June.
Tulip (Darwin varieties).	1 foot.....	Pink, scarlet, yellow, purple.....	April, May.
Shasta daisy.....	2½ feet.....	White with yellow.....	June.
Snapdragon.....	3 feet.....	White, pink, rose, yellow.....	May to October.
Sweet William.....	1 foot.....	White, scarlet, pink.....	May and June.
Wallflower.....	1 foot.....	Yellow.....	March, April.
Violet.....	6 inches.....	Blue.....	March, April, October.
Verbena.....	8 inches.....	Blue, purple, pink, white, red, yellow.....	May to October.

SUGGESTIVE BORDERS.

Borders of annuals when white, blue, and pink colors are desired.—Cosmos, cornflower, aster, larkspur, annual phlox, annual stock, nigella, alyssum.

Borders of annuals where white, yellow, and orange colors are desired.—Cut-and-come-again sunflower, zinnias, calendula, calliopsis, marigolds, and nasturtium.

Clusters of annuals for an isolated corner.—Blue cornflower, calliopsis, yellow marigolds, and alyssum.

Borders of annuals to hide unpleasant views.—Castor oil plant, cut-and-come-again sunflower, zinnia, dwarf marigolds.

Borders of perennials where white, blue, and pink colors are desired.—Hollyhock, shasta daisy, snapdragon, scabiosa, platycodon, hardy aster, columbine, delphinium, phlox, canterbury bells, foxgloves, violets.

Borders of perennials where white, yellow, and orange are desired.—Golden glow, gaillardia, tulip, wallflowers, dahlia, oriental poppy, snapdragon, peony.

Cluster of perennials for an isolated corner.—Light blue delphiniums and canary yellow columbine, followed by late flowering phlox.

Borders of perennials to hide unpleasant views.—A background of shrubs with phlox, peony, and iris.

Securing plants and planting borders.—In ordering flower seed for borders of special colors separate packages of seeds of these particular colors should be ordered instead of mixed packages of seeds. Like vegetable seed, flower seed should be purchased from reliable seed houses that make a specialty of carefully selecting the seed plants.

The annual flowers should be started in hotbeds in February and transplanted into the borders in April, where they should be placed far enough apart in the cluster to prevent crowding. The low-growing plants used for the edges may be planted directly into the border; in order to extend the flowering period late into the fall there should be two plantings of such flowers as aster. The first planting in February in hotbeds, the second in July in seed beds. For care of plants in hotbeds see "Raising of vegetable plants."

Satisfactory plants of perennial flowers can be grown more cheaply than they can be purchased. There is also the advantage of having the plants on hand when they are needed. The seed of each variety should be planted in seed beds in August and the plants transplanted in rows 2½ inches apart in cold frames in October. The plants should be transplanted in clusters in the flower border in April. For care of plants in the cold frames see "Raising of vegetable plants."

Many desirable bulbs can be secured at a reasonable price if they are purchased in quantity. Spring flowering bulbs should be planted in flower borders in November and January. Summer flowering bulbs should be planted in the flower borders from April to June. They should be planted to a depth of 4 inches. Like the plants, bulbs should be planted in clusters throughout the entire length of the border.

FLOWER BORDER CALENDAR.

February.—Sow in hotbeds seeds of annuals such as calendula, calliopsis, cornflower, larkspur, marigold, zinnias, stock, also seeds of perennials such as single dahlia, snapdragon, verbena.

March.—Plant peonies and day lilies in flower border. Prune roses. Root cuttings of roses. Sow foxgloves in cold frame.

April.—Prepare the soil in the flower borders. Transplant with the flower borders the plants started in the hotbeds in February. Sow seed of low growing flowers along edge of borders. Plant summer flowering bulbs, gladiolus, canna, dahlias, lily.

May.—Prune spring flowering shrubs after blossoms have fallen. Root cuttings of spring flowering shrubs. Plant gladiolas, dahlias.

June.—Transplant into rows in the vegetable garden the foxgloves started in the cold frames in March.

July.—Plant in seed beds, seeds of aster and cosmos for late blooming.

August.—Sow in seed beds, seeds of perennials such as columbine, delphiniums, platycodons, coreopsis, gaillardias, canterbury bells, oriental poppy, scabiosa, shasta daisy, wallflower, and pansies.

October.—Transplant perennial flowers from seed beds into cold frames.

November.—Plant spring flowering bulbs, crocus daffodils, and iris into flower borders. Mulch flower borders with well-rotted manure.

Care of the border.—Until the plants are large enough to shade the soil and crowd out the weeds the borders should be hoed just as a vegetable garden is. To produce a bushy growth the tops of such plants as cosmos and wallflowers should be pinched out. In long periods of drought the borders should be watered thoroughly. Evening is the best time to water. An occasional thorough watering does more good than more frequent light sprinklings. To keep the borders attractive there should always be a supply of new plants to take the places of those that die, and of the annuals that have finished blooming. Likewise all flowers should be picked as soon as they fade in order to stimulate further bloom, for when a plant produces



The joy of flowers in the home depends upon their artistic arrangement.

seed its duty is accomplished and it dies. The bulbs should be removed after the foliage dies down, and new plants should be put in their place.

Every three years the flower borders should be spaded, well manured, and replanted. The clumps of perennials can be divided to make new plants.

CUTTINGS.

Herbaceous plants, such as geraniums and carnations.—The cuttings should be from 3 to 4 inches long, and should be selected from the vigorously growing side branches containing flower buds. The cutting is severed from the plant by a smooth horizontal cut, made with a sharp knife, just below a leaf. In herbaceous plants roots develop at the nodes, and any portion of the stem left below this point is nonfunctional and decays. To guard against too

rapid transpiration, remove the lower leaves close to the stem and cut the upper leaves in halves. The cuttings should be kept in water until they are placed in the sand.

Place the cuttings 2 to 3 inches deep, in rows, in flats filled with coarse sand free from organic matter. Press the sand closely around them. Never thrust the cuttings into the sand. The rows should be just far enough apart to keep the cuttings from touching. As far as possible plant but one variety of cuttings in a flat. The sand should be kept moist, not wet, and the cuttings shaded from the direct rays of the sun until a callus is formed and roots started on each, when they should be transferred to small pots. The cuttings grow faster if they are put in small pots at first and transferred to larger pots as the roots become crowded, instead of being put in large pots at the beginning. A good potting soil is made of one-third sand, one-third leaf mold, and one-third garden soil. (For the making of flats, see School Home-Garden Circular No. 6.)

Rose cuttings.—Rose cuttings should contain about four buds and should be from 3 to 4 inches long. They should be selected from wood that is nearly matured. The lower cut should be made just under a bud and upper cut just above a bud. In preparing cuttings of woody plants the lower cut should be made as nearly horizontal as possible without splitting the stem. The thorns and lower leaves should be removed and the upper leaves cut in halves. The cuttings should be kept in water until they are placed in the frame to root.

A frame of any desired length and breadth should be made. It should be 1 foot high and placed over a pit 18 inches deep. Fill 3 inches deep with coal cinders, 2 inches with leaves, and 1 foot with soil made of equal parts of coarse sand and good garden soil. Pack the soil thoroughly; then add 4 inches of coarse sand, and water well. (For location and construction of frame, see "Raising vegetable plants.")

The cuttings should be placed 2 to 3 inches deep in furrows made in the sand with a dibble. The sand should then be pressed firmly about them. Never thrust the cuttings into the sand. The rows need to be far enough apart to prevent the cuttings touching. The cuttings should be shaded in such a way as to insure ventilation, and the soil should be kept moist but not wet. The following spring, or possibly the same fall (depending upon the time the cuttings were made), they will need to be transplanted to a nursery row, where they should remain for one or two years, when the plants will be large enough to transplant to permanent places.

Hardy shrubs, such as forsythia, spiraea, grapes, dogwood, high-bush cranberry.—The cutting should be from 6 to 9 inches long and should be selected from strong, healthy, mature wood of the current year's growth. The lower cut should be made just under a bud and the upper cut just above a bud. To prevent drying, the cuttings should be planted as soon as they are made. Prepare the soil thoroughly; make a V-shaped trench 6 to 9 inches deep; put 1 to 2 inches of sand in the bottom of the trench, and place the cuttings 3 inches apart against the side of the trench so that only the top one or two buds of each are above the ground. Put 1 to 2 inches of sand around the base of the cuttings, then press the soil firmly about them. The cuttings should be rooted in a well-drained section of the garden where they will not interfere with the regular garden operations of the following year. In some locations a winter protection of leaves or coarse stable manure will be needed. Overprotection does more harm than good. The next fall the cuttings will be ready to move to a nursery row, where they should remain one or two years, when the plants will be large enough to transplant to permanent places.

In sections of the North, where the soil freezes to a depth of 6 inches and over, root the cuttings by placing them lower end up in a trench 18 inches deep. Pack sand closely around the cuttings and fill the remainder of the trench with soil. Then mulch with 1 to 2 feet of

straw. The following spring transfer the cuttings to a V-shaped trench and proceed as described above.

Time to root cuttings.—Cuttings of herbaceous plants may be rooted at any time; cuttings of roses from June to October, depending upon the location; and cuttings of hardy shrubs any time from August to the following spring, after the wood has matured.

PLANNING AND PLANTING FRONT YARDS.

Seventh grade, Project XI.

The day has passed when a shrub can be planted anywhere in the front yard. There is a particular place for the shrub or it is out of place. L. H. Bailey says: "Where to plant is really more important than what to plant."

Aside from the ever-present necessity of neat and clean grounds, the attractiveness of the front yard is dependent upon three principles: (1) "Tying" the house down to the ground with occasional shrubs and vines so placed that they will not crowd each other but will break the severe lines between the house and the lawn. (2) Choosing and arranging these shrubs with one, two, or three kinds as a basis. (3) Leaving the centers in lawns free of unnecessary walks, drives, piles of stones, or pieces of statuary.

A home could be attractively planted with either of two groups of plants—those that are not native and therefore must be purchased or grown from cuttings and those that are native and easily available. The native plants are to be preferred, since they not only decorate the home but attract the birds by providing shelter and food throughout the winter months.

A suggestive list of the plants that are not native is given herewith:

Shrubs.—Abelia, althaea, barberry, deutzia, forsythia, hydrangea, Japanese quince, dwarf euonymus, lilac, privet, roses, spiraea, snowball, syringa, weigelia.

Vines.—Boston ivy, clematis, English ivy, wistaria, climbing roses, climbing euonymus.

The following list does not begin to exhaust the desirable native plants of the South.—Similar lists could be made for other sections. Native flora should be studied with this purpose in view.

Shrubs.—Azalea, arrowwood, black haw, coralberry, dogwood, elderberry, high-bush cranberry, indigo, Indian currant, laurel, rhododendron, sweet shrub, sheepberry, sweet pepper bush, wild rose, witch-hazel.

Vines.—Greenbrier, honeysuckle, trumpet vine, Virginia creeper, wild grape, yellow jessamine.

Trees.—Dogwood, hackberry, Hercules club, holly, red cedar, service berry, wild cherry, wild crab, fringe tree.

Transplanting.—Many shrubs are stunted by careless planting. The hole in which the shrub is to be placed should be deep enough so that good loam may be filled in for the new roots to feed upon and the shrub placed at the same depth it was before. It should also be wide enough for the roots to be well spread out. The shrub should be placed erect and the soil thoroughly packed around the roots. To balance the loss of roots, half of the branches should be removed at time of planting.

Pruning.—The shrubs and vines used to beautify the home should require very little care or attention other than the removal of old, dead, broken, or rubbing branches.

Shrubs in the back yard to be used as screens or to supply flowers should be pruned as follows: Spring flowering shrubs, such as forsythia, should be pruned immediately after blooming. Summer and fall flowering shrubs, such as roses, should be severely pruned in the early spring before the buds open. See "Pruning of flowering shrubs, vines, and mature trees."

REFERENCES.

- United States. Department of Agriculture. Farmers' Bulletins:
 157. The Propagation of Plants.
 181. Pruning.
 185. Beautifying the Home Grounds.
 195. Annual Flowering Plants.
 494. Lawn Soils and Lawns.
 750. Roses for the Home.

 THE LAWN.

Seventh grade, Project XV.

To make and maintain a good lawn requires experience and a money outlay. The lawn contributes so richly, however, to the attractiveness of a home that an effort should be made to have one.

Lawn grasses.—Kentucky blue grass, red top, Bermuda grass, white clover, and Italian rye are used in lawn grasses. Mitchell, Philadelphia, Pa., George Tait & Sons, Norfolk, Va., and T. W. Wood, Richmond, Va., as well as many other reliable seed firms, have given years of careful study to the production of lawn mixtures for the South. In ordering the seed, state whether it is to be used for sunny or shady positions, or on terraces, and whether the lawn is large or small. The mixture will vary somewhat according to your special needs.

Carefully selected re-cleaned seeds are the most economical to buy although the original cost is greater. A bushel of such seed should weigh 20 pounds.

Preparation of the soil.—A lawn can not be made or maintained in a poorly prepared soil. If the soil is poor, it should be improved by growing and turning under green manuring crops of cowpeas and clover. It should also receive a liberal dressing of well-rotted manure, that is free of weed seeds. The manure should be used at the rate of a two-horse load to every 30 square feet. In addition to the manure, bone meal should be applied at the rate of 1,000 pounds per acre. The soil should be deeply plowed or spaded, then thoroughly harrowed or raked. When it is in the finest possible condition it should be carefully rolled until it is perfectly level. A top dressing of 2 inches of good loam should be added. Just before the seeds are sown a high-grade commercial fertilizer should be applied at the rate of 500 pounds per acre. This should be thoroughly raked into the soil. No soil can be too well prepared.

Fresh manure contains too many weed seeds to be used in a lawn.

Drainage is as necessary in the making of a good lawn as in the making of a good garden. If the soil remains wet after a rain, it should be tile drained. The drains should be placed closer together and nearer the surface than for garden crops. A carefully prepared clay loam is an ideal soil for lawns.

Planting and replanting the grass.—Grass seed may be sown either in the fall from September to November, or in the spring from February to April. To insure a perfect stand, the seed should be sown broadcast one way then again at right angles and carefully raked into the soil to a depth of one-eighth to one-fourth inch. If the surface is rather dry, the seed will rake in better. After the seeds are raked in the soil should be rolled in both directions. Experience shows that a better sod is secured by sowing lawn grass seed thickly, 1 quart to 150 square feet or 5 bushels to the acre. If the grass comes up thinly sow some more seed. After the first cutting again sow seed evenly over the entire surface. This time at the rate of 1 pint to 150 square feet. Cover these seeds by broadcasting fine soil to a depth of one-eighth of an inch, then roll the lawn.

Additional light sowings should be made each spring and fall and during a rainy spell in the summer. All bare places should be respaded and planted with double the required amount of seed. All holes made by pulling out of weeds should be replanted with grass seed.

In sections of Virginia and North Carolina where blue grass will not thrive, a lawn may be made of Bermuda grass. The entire surface may be planted with turf or pieces of turf, 2 inches square, may be laid every 10 inches all over the surface. To save moisture and to kill weeds the spaces between the plants should be kept hoed until the plants, which spread rapidly are large enough to cover the entire surface.

Bermuda grass makes a green lawn in summer, but turns brown in the fall. If a green lawn is desired throughout the winter, the lawn should be raked with an iron rake so as to loosen the top soil. There is no danger of hurting the roots of the Bermuda grass. Then white clover at the rate of 2 pounds per acre and blue grass at the rate of 4 bushels per acre should be sown and the lawn rolled. This seeding needs to be repeated each fall, for in the summer the Bermuda grass will crowd out the clover and blue grass.

Care of the lawn.—Since all soils contain weed seeds, that sprout as soon as soil moisture and temperature conditions are favorable, the pulling up of weeds will be the first attention the new lawn will require. Every weed should be pulled up as soon as it appears.

When the grass is 4 inches tall it should be cut with a sharp lawn mower. The mower should be set to leave 2 inches of grass. If the grass is mowed frequently, about once every 10 days, the clippings will not be long and can be left to shade the roots. During dry, hot days in summer the mowings should be just frequent enough to keep the grass from starting to produce seed stalks.

During a drought the lawns should be thoroughly watered once every 10 days. An occasional saturation is much better than a daily sprinkling.

In addition to the reseeding each year the lawns should have a light application of bone meal in the spring and again in the summer and fall. Some seed firms prepare a special lawn fertilizer that is satisfactory.

References.—Farmers' Bulletin No. 494, Lawn Soils and Lawns, Seed Catalogues.

CALENDAR OF CLASSROOM WORK IN GARDENING.

Fifth grade.

SEPTEMBER.

Growing winter cabbage: Project I.
Preparation of the winter garden soil: Project II.
Planting the winter garden: Project III.

OCTOBER.

Review October planting.
Making a compost heap: Project IV.
Making a hotbed: Project V.
Protecting the garden from early frosts.

NOVEMBER.

Review November planting.
Planning the garden: Project VI.

DECEMBER.

Raising vegetable plants.

HOME GARDENING FOR CITY CHILDREN.

JANUARY.

Making a flower border: Project VIII.
Preparation of garden soil: Project IX.

FEBRUARY.

Growing Irish potatoes: Project XI.
Planting the spring garden: Project X.
Growing tomatoes: Project XIII.

MARCH.

Review March planting.
Care of growing crops: Project XII.
Insect enemies and control: Project XIV.

APRIL.

The summer garden: Project XV.
The fall garden: Project XVI.

MAY.

Review May planting.
Canning: Project XVII.
Marketing tomatoes: Project XIII.
Growing November lettuce: Project I.

Sixth grade.

SEPTEMBER.

Cleaning up the garden: Project III.
Growing a winter garden: Project IV.
Rooting rose cuttings: Project II.

OCTOBER.

Review October planting.
Care of headed lettuce: Project I.
Green manuring crops: Project V.
Protecting the garden from early frosts.

NOVEMBER.

Review November planting.
Making hot beds.
Planning the garden: Project VI.

DECEMBER.

Raising vegetable plants: Project VII.

JANUARY.

Making a flower border: Project VIII.
Preparation of the garden soil: Project X.

FEBRUARY.

Growing strawberries: Project IX.
Growing head lettuce: Project XI.
Growing a spring garden: Project XII.

MARCH.

Review March planting.
Care of growing crops: Project XIII.
Insect enemies and control: Project XVI.

APRIL.

Bean growing: Project XIV.
Tomato growing: Project XV.
Summer garden: Project XII.
Fall garden: Project XII.

MAY.

Review May planting.
Canning: Project XVII.
Marketing: Project XVIII.
Growing perennial flower plants: Project XIX.

Seventh grade.

SEPTEMBER.

Care of perennial flower plants: Project XIX, sixth grade.
Growing a winter garden: Project I.
Growing head lettuce under glass: Project III.

OCTOBER.

Renew October planting.
Growing sweet peas: Project IV.
Storing vegetables: Project II.
Organic matter for the home gardens.
Protecting the vegetables from early fall frosts.

NOVEMBER.

Renew November planting.
Rooting cuttings of grapes: Project VI.
Rooting cuttings of flowering shrubs: Project VII.

DECEMBER.

Planning the garden: Project XIII.

JANUARY.

Raising vegetable plants: Project XIV.

FEBRUARY.

Preparation of the garden soil: Project XV.
 Growing a spring garden: Project XV.
 Raising fresh fruits: Project VIII.

MARCH.

Review March planting.
 Making a hardy flower border: Project V.
 Pruning mature trees: Project IX.
 Pruning flowering shrubs: Project X.
 Planning the front yard: Project XI.
 Lawn making: Project XII.

APRIL.

Review April planting.
 Care of growing vegetables and flowers: Project XV.
 Insect enemies and control: Project XV.

MAY.

Review May planting.
 Canning: Project XVI.
 Marketing: Project XVI.
 Drying: Project XVI.
 The fall garden: Project XV.