ALABAMA

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute

AUBURN

CIRCULAR NO. 13

December, 1911

SCHOOL GARDENING

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SCHOOL GARDENING

BY

F. E. LLOYD AND L. N. DUNCAN

For a number of years interest in the study of living things has been steadily growing and more recently the attention of educators has been directed toward the importance of agricultural education in a broad sense.

It is now recognized as most desirable that gardening should become a part of our elementary school work.

The opinion has steadily gained ground that no elementary education, especially for city children, is complete and well balanced without work of this kind. Indeed school gardening represents a legitimate development of a modern tendency in education to study things themselves rather than to study about things in books, or to put it in another way, to have a child learn by doing rather than by talking about it. Thus the text book, which originally was and still is largely a compendium of information, is being supplanted by the laboratory manual, or book of guidance. As a result of this change a more constructive mental activity characterizes the work of pupils in manual training, domestic art and science and school gardening. The claim is made that all this is a legitimate and proper part of education, but it is clearly not the kind of formal education we have been used to. It may, therefore, be objected that school gardening is not a part of education properly speaking and is something more or less extraneous and somewhat of an imposition upon the already fully worked, if not overworked, teacher.

It will, therefore, be our aim in the present pamphlet to show that school gardening is not only a legitimate phase of education, but a necessary and extremely important part, and further to show that what may be regarded as an imposition of more extensive duties, is really so only in appearance.

School Gardening as a Factor in Education.

In a broad way what is meant by education? Our usual conception of education is derived from the overshadowing of our general experiences by our experiences in the school. Living is more or less informal; going to school is a set activ-

Children Among Their Plants, Elyton (Ala.) Public Schools

(Courtesy of Superintendent N. R. Baker)

ity. We are expected to go to school at a certain hour each day and on certain days in the year. This is a formal duty and as such dominates, in a sense, the remaining part of our activity during childhood. In this way we gain the impression that our school hours during this period are by far the more important from the point of view of education. Indeed it is generally supposed that they constitute the whole of education.

Boys for the most part, at least healthy ones, are spending most of the time out of school and a part of the time in school being mischievous, but if we stop to realize that their mischievousness is a very important factor in their education, we will see that they must be learning at least as much out of school as they do in school. In reality, however, I think it will be conceded that we learn very much more outside of school.

Let us for a moment think of ourselves as being compelled to go through life knowing only those things learned in school. We do not have to reflect long on this supposition to admit that we would be very helpless, pitiably so. How do we explain this? The explanation of course lies in the fact that in our waking hours, unless we are hopelessly lazy and indifferent, we are constantly gaining experiences which enable us to get along in life.

In school we acquire facility in certain definite directions or rather we should do so, and we attain to refinements of speech and writing and knowledge generally, so far as possible.

The school, therefore, is an attempt to organize our experiences and refine our modes of expression or in general, to standardize our actions with respect to society at large. From the point of view of life, therefore, any school exercises which will make our common experiences return more value educationally are well justified, provided only that we are rational in regard to the amount of time required.

From another point of view, we learn things in life by a sort of hit and miss arrangement. We try and fail and by this process gradually learn to do things more or less as they should be done. In school we try to direct our efforts so that

we may reduce the number of failures as far as possible. To this end we direct our effort with reference to a particular purpose and so we come to use the experimental method consciously.

For example, there is no doubt of the value of elementary physics or elementary chemistry, under whatever name you please to call them, in elementary education, and we concede that the value of these lies not alone in the information obtained, but in the process of experimentation. Precisely so it is with school gardening. This may be made an experimental study dealing with a wide range of biological phenomena, which are of interest of themselves as well as for their bearing upon practical life.

We may say, therefore, that the school garden is an especially valuable opportunity for applying the experimental method, within a field which touches our practical life at many points. To enter somewhat more into detail in regard to this value, we may say that school gardening offers a means for cultivating skill and manipulation, which awakens the interest and ambition of young pupils and leads them gradually to develop mental qualities of ambition, desire for success and the like, without which no good work can be done. It is of fundamental importance that success or failure leads a healthy mind to desire to understand why effort succeeds or fails.

It is this conscious study of the causes for success or failure which makes us sure of ourselves. Thus a successful business man, in the proper sense, is one who is keenly aware of the causes underlying the course of events in his business. The farmer, in this case, is in the same class, and success in life, in a broad sense, is connected with this conscious analysis of the basis for success or failure.

Let us give a concrete illustration of how school gardening works in this way. Supposing that we propose to plant some seeds. Instead of the teacher telling exactly how these seeds should be planted, the question is raised as to how they should be planted, or even more specifically, how deep. One boy says one thing, another another. The proper answer is, "Well, go ahead." Let one boy try it in one way and another pupil in another. Why should we come at it in this apparently

random fashion? According to the canons of formal education, the teacher should tell the pupil how to plant the seeds, but according to education in the best sense, it is the function of the teacher to show his pupil how to learn for himself. If now the seeds are planted at a half-dozen different depths, here is the real opportunity of the true educator. Moreover, this element of uncertainty puts the pupils on the watch. It introduces a little bit of the spirit of adventure, the willingness to take a certain amount of risk for the sake of finding out, the willingness to lose in order to gain, that is more real success than anything else. It will be seen from what we have said that failure may at times be very much more important than success, in regard to its educational value.

In this very brief discussion, we hope we have made the central thought clear, namely, that the process of doing things can be made of very great educational value and we think, on the whole, more than merely book study of the same things.

How School Gardening May Be Made a Part of the Course.

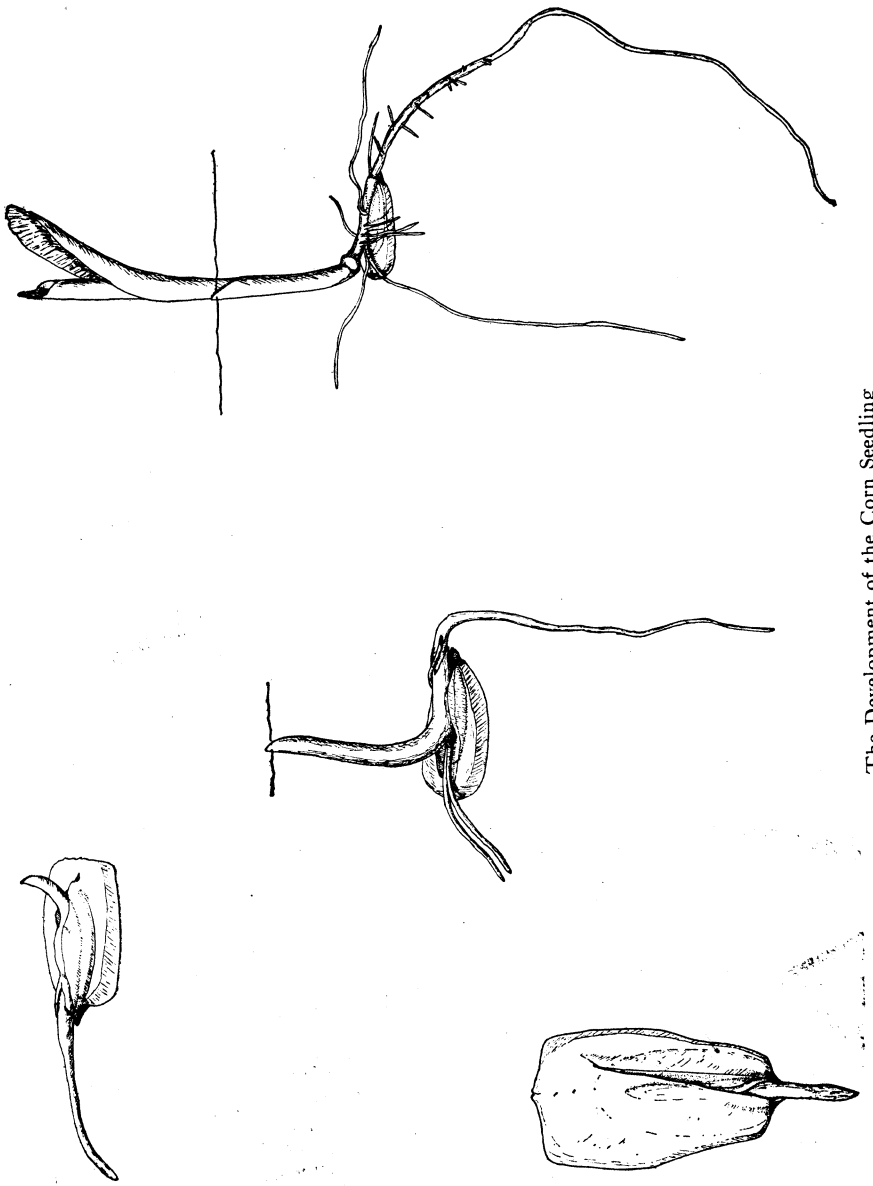
Let us see now, briefly, how school gardening may be introduced into the curriculum without imposing an additional burden on the teacher. This is a practical point which will occur at once and must be met. The answer lies in the possibility of bringing school gardening to the aid of the other studies. The experiences and materials may, for example, be used as objects forming the basis of work in English.

Instead of taking some object at random and expecting the pupils to write an essay on it, suppose we have objects supplied to them in which the pupils are vitally interested. It is this interest which forms the spring of good writing. One cannot write vividly about extraneous things which are forced upon the attention. One rather writes vigorously upon the things in which he is interested, into which he has put his effort. Let us see, for example, how much more readily our pupils will write about the germination of seeds than they will about a vase or some other object set up in front of the class as a basis for a composition.

Then again, let us take arithmetic. Measurement of one kind or another is the basis for arithmetical work. With this

thought in mind, we see at once what an opportunity is afforded by work in gardening. The measurement of plots of ground, calculations of areas, measurement of rate of growth, calculations in regard to quantities of fertilizer to be used, the question of costs entailed by operations on a large scale, and numberless other matters. Instead, therefore, of introducing arbitrary illustrations of examples in arithmetic, if we use examples furnished by our experiences, arithmetic comes at once to mean a very great deal to the pupils.

FIGURE I.



The Development of the Corn Seedling
(Drawings by C. S. Ridgeway)

What to Do with the Materials Grown in the Garden.

Usually many more seed will be planted than may be allowed to grow. Young seedlings should be taken into the school room for a more careful study of their parts with special reference to their behavior during the process of germination. This will afford an excellent opportunity for close observation and for practice in drawing. It is a widely adopted plan, and justifiably so, to have the pupil try to show "how the seedling comes out of the ground" by making a series of drawings at different stages of the seedlings' growth. The figures which are given herewith will give a clear idea of how these drawings should be made. The use of color, either chalk, paraffin crayon or water color will contribute to the effectiveness of the work. Indeed there is no reason why artistic sketches and effects should not be sought for, the purpose being to stimulate the interest of the student.

The plants as a whole also furnish abundant material for the study of elementary botany, both that dealing with the more obvious structures and with the behavior. The tendrils of English peas for example may be seen to be modified leaves, and, by attaching small weights, it may be determined the pull they can exert. It is clear that much space could be filled with such examples.

Locating the Garden.

In a great many cases school garden work is not undertaken because the school grounds are small. It is not necessary however, to have a very large area to do good work. As a matter of fact, some of the most effective work with plants has been done with comparatively small areas.

In selecting and locating the ground for the garden, careful attention should be given to convenience and the effect it will have on the landscape and surroundings of the school. The garden should be as accessible as possible and should harmonize with the walks and plantings so as to lend beauty to the school grounds.

It is almost useless to attempt school garden work unless the ground is inclosed. A few posts and some wire netting

will cost very little and the fence may be built largely by the pupils. This will insure protection from careless persons who might walk over the plots or prevent a loose animal from destroying the plants.

There are two plans in use in school garden work. There may be one general garden where all of the pupils have a common interest or each pupil may be assigned a small plot of ground for an individual garden. Where the area for garden work is small and the teacher has large classes it is probably better to have one general garden. If plenty of land is available and the teacher has time for the work the individual garden is better. The individual plot gives greater opportunity for experiments, encourages a spirit of rivalry and helps to develop the individuality of the pupils.

In some cases a combination of the two methods may also be very good. There are certain experiments of general interest which may be carried out in common on larger plots and in addition to this each pupil may have a small area for individual work. This gives an opportunity to test fertilizer mixtures, new crops, and to demonstrate better cultural methods which might be of interest and value to the farmers of the community at large.

If the land is not already very fertile ten to twenty loads of barn-yard manure per acre should be evenly distributed over the entire ground. The land should then be deeply and very thoroughly plowed and harrowed until the soil is fine and the surface even. This part of the work cannot be too thoroughly done.

Necessary Tools.

It will be necessary to have a few tools in common which may be owned by the school if possible. This list should include a wheelbarrow, two or three hand rakes, hoes and shovels. Each pupil may also bring, from home, such additional tools as may be available and may be needed.

Seeds and Fertilizers.

Small quantities of garden and farm seeds are usually left after planting the garden and crops at home which the parents will glady contribute. From this source and from the regular

Congressional distribution of seeds enough seeds to plant the garden may be secured, in most cases. Commercial fertilizers, in small amounts, may also be secured from about the farms. Local fertilizer plants, in a number of cases, will gladly donate samples of several brands of fertilizers to be tested out by the pupils.

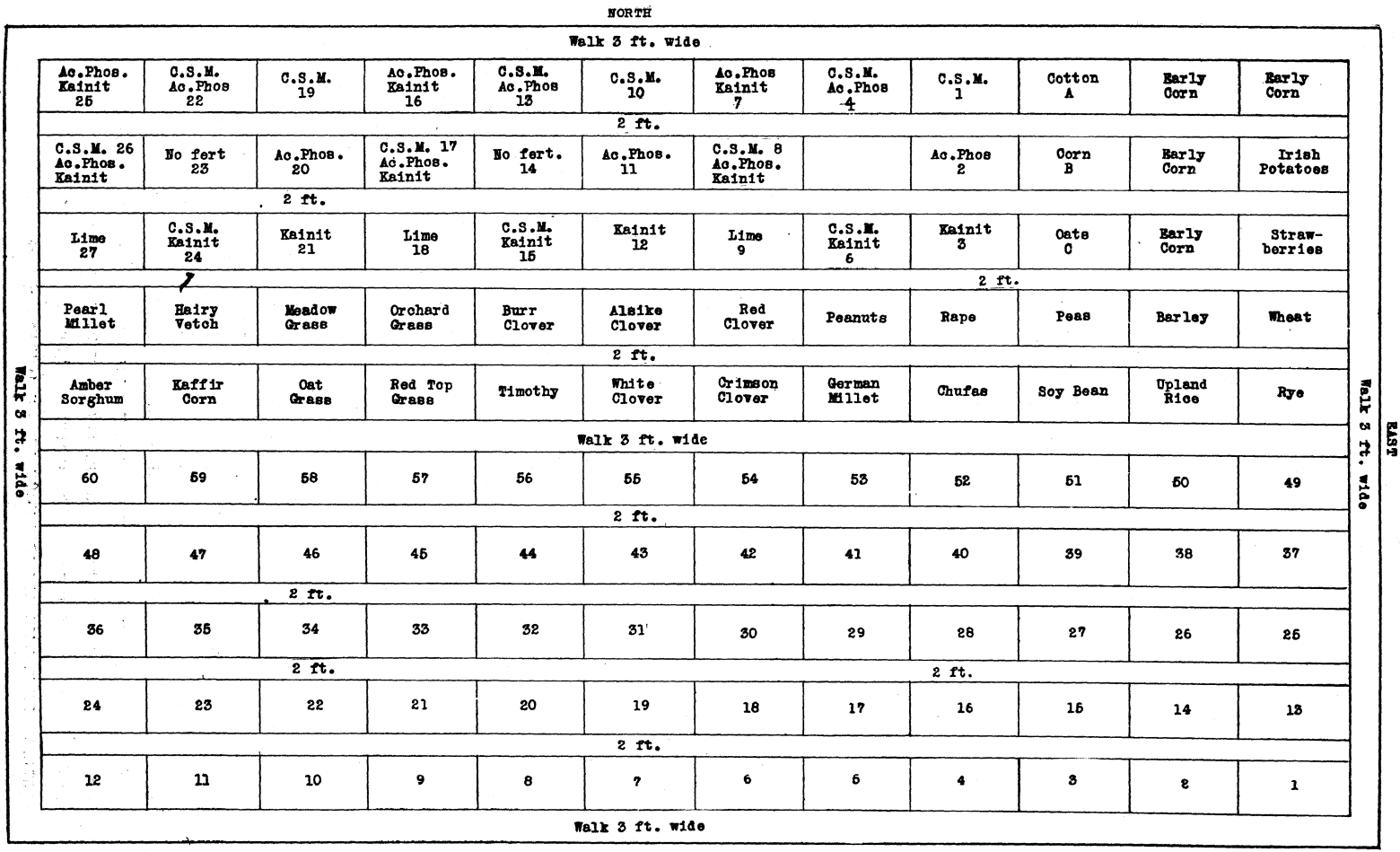


FIGURE II.

Suggested Plan for General and Individual Gardens Combined. The Blank Plot in General Garden should be No. 5 and should have "No Fertilizer"

Planning the Garden.

In the plan given on page 11, Figure II, a combination of the general and individual gardens is suggested.

In this plan it is contemplated that the south half of the garden, plots numbered from 1 to 60 inclusive, is to be used for individual gardens, each pupil being assigned one plot.

The north half is to be devoted to a general garden in which all pupils have a common interest. It will be noticed that the larger crops, fertilizer tests and rotation work are to be reserved for the general garden while the individual garden is to be planted largely to vegetables.

In the general garden four plots are to be devoted to early corn. Early Cory, Adams, Country Gentleman and Stowell Evergreen are suggested as varieties of early corn to be planted.

One plot should be planted to the Triumph or some other standard variety of Irish potatoes.

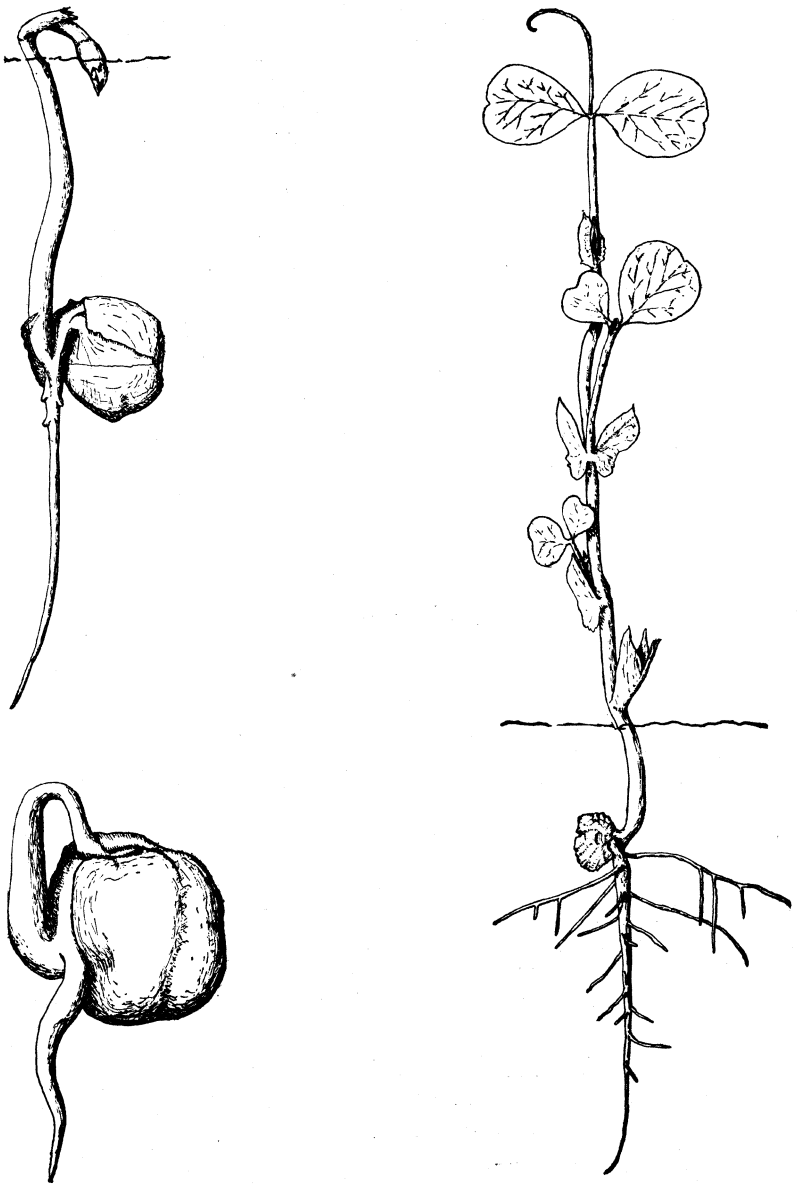
Lady Thompson or some other well known variety may be used for the strawberry plot.

Plots A B and C are to be used in a three-year rotation. The rotation runs from C towards A, that is, cotton followed by corn, corn followed by oats, and then cotton again. In September some winter cover crop may be planted between the cotton rows, the seed being sowed broadcast and lightly covered. Hairy vetch, crimson clover, or one of the small grains may be used as a cover crop. At the last cultivation of the corn, cowpeas should be planted in the middles. The oats should be planted in the early fall and after they mature in May or June they should be followed by cowpeas, peanuts, or soy beans.

Fertilizer Test with Different Crops.

Plots numbered 1 to 27 inclusive in the general garden are to be used as a fertilizer test, using the fertilizer or the fertilizer mixture indicated on the plots. Plots 1 to 9 inclusive are to be planted to fall oats or wheat, 10 to 18 to cotton and 19 to 27 to corn. Each series of 9 plots comprise a complete fertilizer test with all of the combinations of nitrogen, phosphorus, potash, and lime and in each series there is a check plot where no fertilizer is to be used. The amounts of these various fertilizers are indicated in the following tabulation:

FIGURE III.



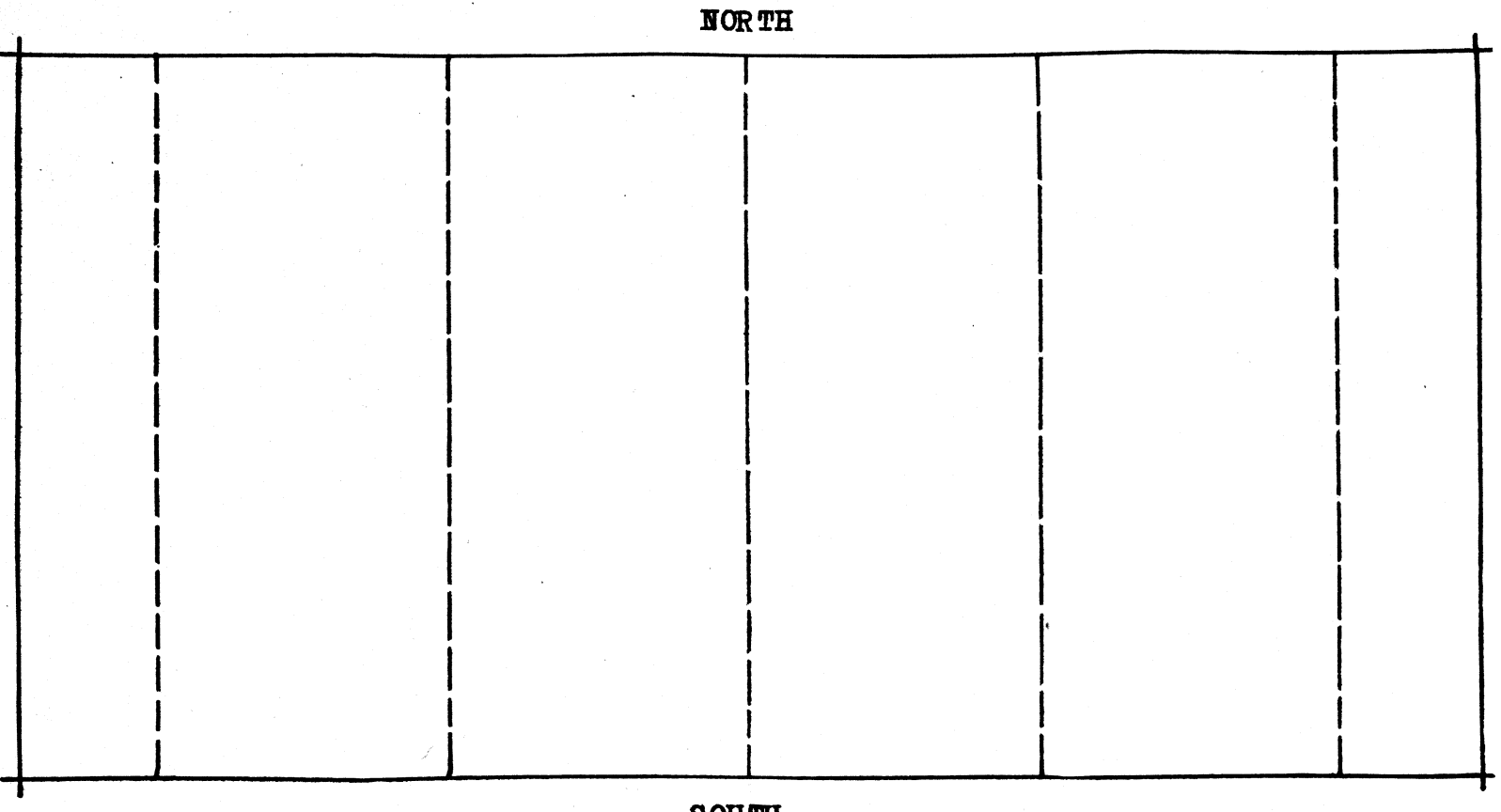
The Development of the English Pea
(Drawings by C. S. Ridgeway)

Plot	*Kind Fertilizer*	*Amt. per acre*	*Crop*
1	Cotton Seed Meal	200 lbs.	Oats
2	Acid Phosphate	240 lbs.	Oats
3	Kainit	200 lbs.	Oats
4	Cotton Seed Meal	200 lbs.	Oats
	Acid Phosphate	240 lbs.	
5	No fertilizer		Oats
6	Cotton Seed Meal	200 lbs.	Oats
	Kainit	200 lbs.	
7	Acid Phosphate	240 lbs.	Oats
	Kainit	200 lbs.	
8	Cotton Seed Meal	200 lbs.	Oats
	Acid Phosphate	240 lbs.	
	Kainit	200 lbs.	
9	Lime	2000 lbs.	Oats
10	Cotton Seed Meal	200 lbs.	Cotton
11	Acid Phosphate	240 lbs.	Cotton
12	Kainit	200 lbs.	Cotton
13	Cotton Seed Meal	200 lbs.	Cotton
	Acid Phosphate	240 lbs.	
14	No fertilizer		Cotton
15	Cotton Seed Meal	200 lbs.	Cotton
	Kainit	200 lbs.	
16	Acid Phosphate	240 lbs.	Cotton
	Kainit	200 lbs.	
17	Cotton Seed Meal	200 lbs.	Cotton
	Acid Phosphate	240 lbs.	
	Kainit	200 lbs.	
18	Lime	2000 lbs.	Cotton
19	Cotton Seed Meal	200 lbs.	Corn
20	Acid Phosphate	240 lbs.	Corn
21	Kainit	200 lbs.	Corn
22	Cotton Seed Meal	200 lbs.	Corn
	Acid Phosphate	240 lbs.	
23	No fertilizer		Corn
24	Cotton Seed Meal	200 lbs.	Corn
	Kainit	200 lbs.	
25	Acid Phosphate	240 lbs.	Corn
	Kainit	200 lbs.	
26	Cotton Seed Meal	200 lbs.	Corn
	Acid Phosphate	240 lbs.	
	Kainit	200 lbs.	
27	Lime	2000 lbs.	Corn

The remaining plots in the general garden are to be devoted to sting forage and soil improving crops as indicated on the plot.

The Individual Garden.

Figure IV. on page 16 suggests how each pupil may arrange the individual garden. The plots should extend east and west and the rows of vegetables should extend north and south so as to get as much sunshine as possible. It is suggested in Figure IV. that the rows may be made two feet apart. The width of the rows, however, should be governed by the planting table on page 20. In plots as small as these, 5 x 10 feet, it will be impossible to grow more than five to six rows. Each pupil may grow five or six different kinds of vegetables, growing a single row of each vegetable. In this case the teacher should encourage the pupils to vary the lists so as many varieties of vegetables as possible may be growing in the school garden. Another method which might also be used to advantage would be for pupil A to plant all of his or her plot to English peas, pupil B to beans, pupil C to beets and so on, having each individual plot growing a single vegetable but different from the other plots.



Suggested Plan for Individual Plot

FIGURE IV.

The Home Garden.

A very valuable and practical line of gardening work for the teacher in connection with the school work, is the home garden. In this case the pupils receive their instructions and directions for the work in the school room, and grow the plants at their homes.

This line of work has many very valuable features. The pupil, doing the work at his home, will cause the parents to take more interest in the work. It connects the home with the school and enables the teacher to get in closer touch with the home. Frequently the garden work is started on the school grounds, but not completed before school is out. In this case there is no one to look after the plants, and a valuable part of the work and the results are lost. Where the garden work is done at home, it is an easier matter to get the pupil to carry the work through to completion.

Where the home garden idea is undertaken, each pupil should be requested to grow a definite area of whatever vegetable or crop may be selected. In assigning vegetables or crops to several pupils, each may be assigned a separate vegetable or crop, so that several lines may be carried on at the same time. As the work progresses, specimens of plants may be brought from the home gardens to the school room to be used in class room study.

Each pupil should be urged to keep an accurate record of all the steps in growing his plants. The history of the crop may be written in booklet form, and this booklet exhibited at the school in connection with the exhibit of crops or vegetables.

PLANTING TABLE FOR CROPS ARRANGED BY SEASONS

FOR SPRING PLANTING

CROP	TIME TO PLANT	Width of Rows Inches	Distance Apart Plants in Rows Inches	Amount Seed To Plant Per Acre	FERTILIZER		Depth to Plant Seed, Inches	METHOD OF PLANTING
					Kind	Amt Lbs. Per Acre		
Chufas	April 1 to May 1	24	2 to 3	1 bu.	10-3-2	500	2	On Level
Corn	Feb. 15 to May 30	24	12	8 to 10 qts.	10-3-2	500	2 to 3	On level or water fur.
Cotton	April 15 to May 15	24	18	3 to 4 pks.	10-3-3	500	2	On Low Level
Kaffir Corn	April 15 to May 30	24	12	2 pks.	10-3-2	500	1 to 2	On Level
Oats	Feb. 1 to Mch. 20	6 to 8	1 to 2	2 bu.	10-3-2	400	1 to 2	Open Furrow
Peanuts	May 1 to June 30	24	8 to 12	1 to 2 bu. *	10-1-2	400	2	On Level
Peas	May 1 to July 10	24	6 to 8	3 pks.	10-1-2	400	2	On level or low bed
Rape	Mar. 1 to May 30	24	3 to 4	4 to 6 lbs.	10-3-2	400	1	On Eevel
Rice Upland	Mar 1 to May 30	6 to 8	1 to 2	80 lbs.	10-3-2	500	2	On Level
Sorghum	April 1 to June 30	24	2 to 3	1 1-2 bu.	10-4-2	500	2	On level or low bed
Soy Beans	April 1 to June 30	24	2 to 3	2 pks-	10-1-2	400	2	On level or low bed

FOR SUMMER PLANTING

Millet Germ.	June 1 to July 15	6 to 8	1 to 2	3 pks.	10-3-2	400	1 to 2	Open Furrow
Feanuts	May 1 to June 30	24	8 to 12	1 to 2 bu. *	10-1-2	400	2	On Level
Peas	May 1 to July 10	24	6 to 8	3 pks.	10-1-2	400	1	On Level
Sorghum	April 1 to June 30	24	2 to 3	1 1-2 bu.	10-4-2	500	2	On level or low bed
Soy Beans	April 1 to June 30	24	2 to 3	2 pks.	10-1-2	400	2	On level or low bed

FOR FALL PLANTING

Barley	Sept. 1 to Oct. 15	12	1 to 2	1 1-2 bu.	10-3-2	500	2	Open Furrows
Clover, alsike	Sept. 1 to Oct. 1	8 to 10	1 to 2	20 lbs.	10-1-2	400	1	On Level
" Burr	Sept. 1 to Oct. 1	8 to 12	2 to 3	20-36 lbs.‡	10-1-2	400	1 to 2	On Level
" Crimson	Sept. 1 to Oct. 1	8 to 12	1 to 2	20 lbs.	10-1-2	400	1	On Level
" Red	Sept. 1 to Oct. 1	8 to 12	1 to 2	20 lbs.	10-1-2	400	1	On Level
" White	Sept. 1 to Oct. 1	6 to 8	1 to 2	15 to 20 lbs	10-1-2	400	1	On Level
Mead. Grass	Sept, 15 toO ct. 15	6 to 8	1 to 2	30 lbs.	10-4-2	500	1 to 2	Open Furrows
Oat Grass	Sept. 1 to Oct. 15	6 to 8	1 to 2	40 lbs.	10-4-2	500	1 to 2	Open Furrows
Oats	Sept. 1 to Nov. 1	4 to 8	1 to 2	2 bu.	10-3-2	400	1 to 2	Open Furrows
Orch. Grass	Sept. 1 to Oct. 15	6 to 8	1 to 2	35 lbs.	10-4-2	500	1 to 2	Open Furrows
Rape	Sept. 20 to Oct. 15	24	3 to 4	4 to 6 lbs.	10-3-2	400	1	On Level
RedTopGrass	Sept. 1 to Oct. 15	6 to 8	1 to 2	30 lbs.	10-4-2	500	1 ro 2	Open Furrows
Rye	Sept. 1 to Nov. 1	6 to 8	1 to 2	1 bu.	10-3-2	500	2	Open Furrows
Timothy	Sept. 1 to Oct. 1	6 to 8	1 to 2	20 lbs.	10-4-2	500	1 to 2	Open Furrows
Vetch, Hairy	Sept. 1 to Oct. 1	12	1 to 2	40 lbs.	10-1-2	400	1 to 2	Open Furrows
Wheat	Sept. 1 to Oct. 1	6 to 8	1 to 2	1 bu.	10-3-2	500	2	Open Furrows

*Unhulled.

‡20 lbs, cleaned: 36 lbs. in burr.

To make 10-3-2 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	1250 pounds
Nitrate of soda (15%)	320 pounds
Muriate (or sulphate) of potash	80 pounds
Filler	350 pounbs
Total	2000 ponnds

To make a 10-1-2 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	1250 pounds
Nitrate of soda (15%)	114 pouuds
Muriate (or sulphate) of potash	80 pounds
Filler	556 pounds
Total	2000 pounds

To make a 10-3-3 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	1250 pounds
Nitrate of soda (15%)	320 pounds
Muriate (or sulphate) of potash	120 pounds
Filler	310 pounds
Total	2000 pounds

To make a 10-4-2 fertilizer mixture on the ton basis use:

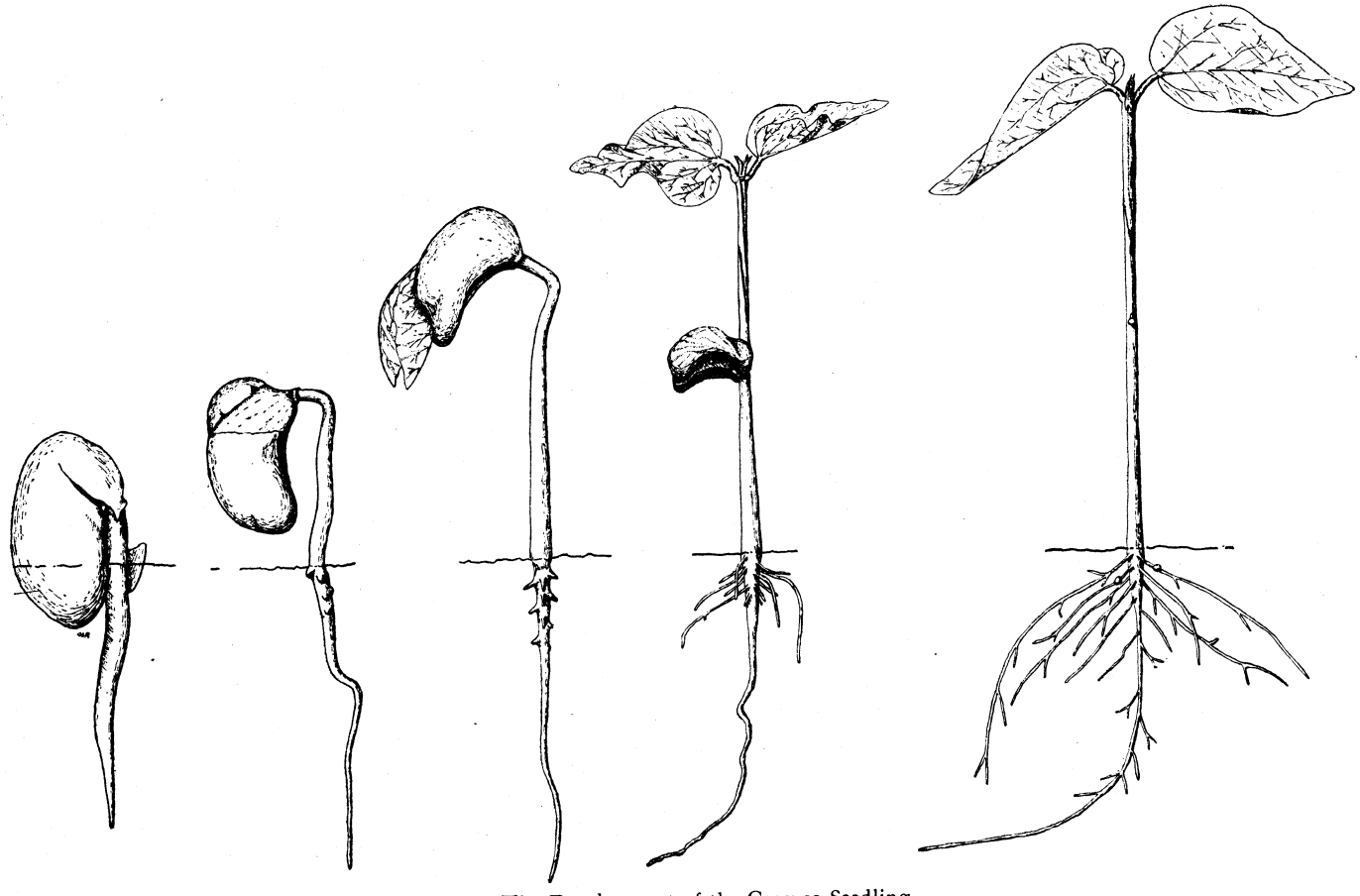
Acid phosphate (16%)	1250 pounds
Nitrate of soda (15%)	442 pounds
Muriate (or sulphate) of potash	80 pounds
Filler	228 pounds
Total	2000 pounds

To make these fertilizer mixtures up to the different compositions it would be necessary to add "filler" as indicated in each case. However, when they are mixed in small quantities for garden use they should be mixed in the proportious given and the "filler" may be left out.

PLANTING TABLE FOR VEGETABLES

CROP	TIME TO PLAET	Width of Rows Inches	Distance Apart Plants in Rows Inches	Amount Seed To Plant Per Acre	FERTILIZER		Depth to Plant Seed, Inches	METHOD OF PLANTING
					Kind	Amt. Lbs. Per Acre		
Beans	March 15 to May 1	20	10	1 peck	10–2–4	500	1½	In drills
Beets	February—March	10—20	4	5—6 lbs.	7–6–9	560	1	In drills
Cabbage	Oct., Mar. to May	30	18	¼ to ½ lb.	7–6–9	500	1	In beds to transplant
Cauliflower	February, in doors	30	15	½ lb.	7–6–9	500	½	In drills
Eng. Peas	Jan. and February	30	1 to 2	1—2 bu.	10–2–4	500	1—2	In drills
Kohl Rabi	Febtuary. in doors	20	10	½ lb.	7–6–9	500	½	In drills
Lettuce	Dec. and January	18	6	----------	7–4–8	500	½	1 oz for 2000 plants
Onions	October—March	15—18	4	5—6 lbs.	7–4–8	500	1—2	In drills
Pepper	March	18	16—20	----------	7–4–8	500	½	In drills
Potatoes, Irish	Jan.—Feb. to Apr.	36	12	8—15 bus.	7–4–8	600	3	In deep furrows
Radish	Jan. and February	10—20	2 to 4	8—10 lbs.	7–4–8	500	½	In drills
Squash	March to April	36	15	----------	7–4–8	500	1	In furrows
Tomatoes	Jan.–Feb. in doors	36	24	4 oz.	7–4–8	500	½	To transplant
Turnips	September–March	10—20	6	2—4 lbs.	7–6–9	500	1	In drills

Credit is due Prof. J. C. C. Price for suggestions on above table.



The Development of the Cowpea Seedling
(Drawings by C. S. Ridgeway)

FIGURE V.

To make a 7-6-9 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	875 pounds
Nitrate of soda (15%)	660 pounds
Muriate (of sulphate) of potash	360 pounds
Filler	105 pounds
Total	2000 pounds

To make a 7-4-8 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	875 pounds
Nitrate of soda (15%)	442 pounds
Muriate (or sulqhate) of potash	320 pounds
Filler	363 pounds
Total	2000 pounds

To make a 10-2-4 fertilizer mixture on the ton basis use:

Acid phosphate (16%)	1250 pounds
Nitrate of soda (15%)	220 ponnds
Muriate (or sulphate) of potash	160 pounds
Filler	370 pounds
Total	2000 pounds

To make these fertilizer mixtures up to the different compositions it would be necessary to add "filler" as indicated in each case. However, when they are mixed in small quantities for garden use they should be mixed in the proportions given and the "filler" may be left out.

Muriate or sulphate of potash, either, may be used except in the case of potatoes and tomatoes. Use the sulphate with these two vegetables.

Flowers.

I think it well to always plant some flowers in connection with the school garden. A few plots may be devoted exclusively in the general garden, to the growing of a few common flowers. If no plots are available for this work, quite a number of flowers may be grown on the borders, along the walks, and about the school grounds. Girls frequently take a great deal of interest in the growing of flowers, and this work may be done largely by them.

Below I am suggesting a few flowers, which may be easily grown, with a few notes or directions, in each case. This list may be varied and largely extended at the discretion and taste of the teachers and pupils.

Ageratum: This is an annual which may be planted in August for winter flowering, or may be sown indoors in boxes, or in a cold frame in early spring, and later planted out. It grows from 12 to 18 inches tall and will bloom in Apil and May.

Alyssum: For fall flowers, sow in August, for spring flowers, sow in April. The plants should be left 3 to 4 inches apart. This is a good plant for borders, pots and baskets. After it blooms cut back, and it will flower again. It will flower most of the summer.

Balsam: This is an annual plant, which may be sown in March or April. The plants should be left 3 or 4 inches apart. It will grow 15 to 18 inches tall, and will bloom from May through the summer. Transplanting several times will dwarf the plants and make them shape up well.

Calendula: This is an annual plant, which may be planted in March. The plants should be left about 6 inches apart. It will grow about 12 inches tall, and will bloom from May through the summer.

Candytuft: This is an annual which may be planted in October and November. Plants should be left about 6 inches apart. It will grow 6 to 12 inches tall, and will bloom from about May 15th for about four weeks.

Chrysanthemums: Plant in May, 18 to 24 inches apart. Plants will grow from 2 to 5 feet tall, and will bloom in October and November.

Coreopsis: This is an annual and should be planted about March. The plants should stand 4 to 6 inches apart. The plants will grow 12 to 18 inches tall, and will bloom from May 15th all summer.

Cosmos: This is an annual plant which may be planted in March and April. The plants should be left 1 1-2 to 3 feet apart. The plants will grow 4 to 5 feet tall, and will bloom in September and October.

Forget-Me-Not: This may be planted in March. It will grow about 6 inches tall and will bloom in the early spring.

Hollyhock: Seed in August 2 to 3 feet apart. The plants will grow 3 to 7 feet tall and will bloom in May.

Nasturtium: Plant in February, 4 to 6 inches apart. The dwarf will grow 6 inches tall and the climbing 8 to 10 feet tall. It will bloom in May, and then all summer.

Poppy: Sow thinly in May and allow plants to stand 1 foot apart. They will grow 2 to 4 feet tall.

Portulacca: Plant about 2 feet apart each way. It will grow about 6 inches tall.

Sweet Peas: These plants do best in rich damp soil. Dig a trench 1 1-2 feet deep and fill with rich loam. Leave the plants six inches apart. Plant in the early spring or in the fall.

Verbena: Sow in March or April and leave plants 2 or 3 feet apart. These plants will bloom in the early summer and on until frost.

Hot Bed.

In some cases where it is desirable to start some of the tender plants before the warm spring weather opens up, it may be necessary to plant the seed either in boxes so that they may be kept indoors and in warm windows, or else in a hot bed.

Location: The hot bed should be located on a rather elevated, well drained piece of soil and should be protected, if possible, from the northern exposure by a wind break such as a fence or a building. It should slope to the south or to the southeast.

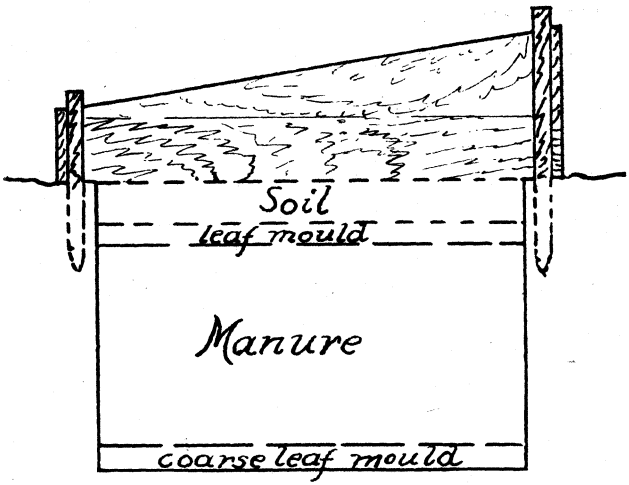
The frame: Rather strong posts should be put down at each corner of the hot bed. Most any ordinary lumber may be used to case up the ends and sides of the frame. The north side, or the rear of the hot bed should be ten to twelve inches high with the soil banked up to carry the water away. The south side or front should be six to eight inches high. In most cases it will not be necessary to use glass as a good strong piece of cloth, such as canvas will be all that is necessary for a cover on cold days. This canvas should be arranged to roll up so that the plants may be sunned on warm sunshiny days.

The pit: In most cases it is best to dig a pit inside of the frame, a few inches smaller all around than the frame. This pit should be eighteen to twenty-four inches deep.

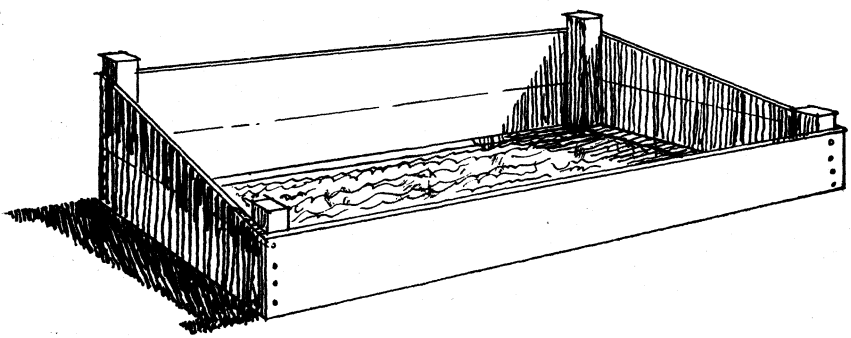
Filling the pit: On the bottom of the pit there should be placed a layer of some coarse, non-conducting material such as leaves or leaf mould to prevent the manure from coming in direct contact with the cold ground in the bottom of the pit. This layer should be two to three inches deep.

Fresh, rich manure should be placed on this to a depth of twelve to eighteen inches. This manure should come directly from the barn where it has not been exposed. It is better to have manure that is free or almost free of straw or other bedding. If the manure is very dry it should be moistened as it is placed in the pit. This manure should be placed in the pit in layers two to four inches thick and each layer carefully packed before the next layer is put in.

FIGURE VI.



Cross Section of Hot Bed



Looking Down on Cold Frame or Hot Bed

Each day the temperature should be noted, the manure well mixed, packed and watered down.

As soon as the manure is placed in position it will begin to rapidly ferment and generate a considerable amount of heat.

On top of the manure should be a layer about two inches thick of leaf mould so that the warmth arising from the manure will be evenly distributed over the entire surface.

On top of this layer of leaf mould should be placed four to five inches of one part leaf mould and two parts of good, rich garden soil in which to plant the seeds.

Planting: In two or three days the temperature will drop below ninety degrees and then such plants as require a very warm temperature should be planted. When the temperature reaches seventy to eighty degrees the cooler plants may be planted.

This top soil should be well mixed and finely pulverized before the seeds are planted. In stirring this soil it is important not to go deeper than the layer of planting soil as it would not be desirable to mix up the top layer of leaf mould or manure with the surface planting soil.

All seeds may be planted in rows a few inches apart and as the plants begin to grow they may be thinned so as to get strong, healthy plants in all cases. When it is necessary to water the plants in the hot bed it is better to thoroughly wet the soil occasionally than to frequently apply small quantities of water.

Transplant from the hot bed to the open field when the plants are large enough and when the temperature will permit.

Cold Frame.

A cold frame may be made in the same manner in all respects as the hot bed, except there is no bottom heat. Make the frame and the canvas for cover and put in the rich garden soil for planting but leave off the pit and the manure.