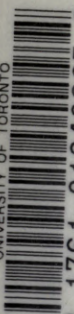


UNIVERSITY OF TORONTO



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SCHOOL GARDENING

W. FRANCIS RANKINE

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BY
W. FRANCIS RANKINE

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SCHOOL



SCHOOL GARDENS, CHURT, SURREY
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INTRODUCTION

IN the curriculum of the rural, the provincial, or even the urban school, there is no more delightful subject than that which is treated of in the following pages. It is a subject that introduces the scholar to the possibilities of the soil and to those physical forces that in days past have built up our national wealth; it brings him into contact with the agencies of Nature whereby the plant is induced to yield its contribution to the dietary of the human race. There is no more fascinating work for boys who in their small gardens learn by "seeing and doing."

Of course, as in all things, it is essential that procedure should be carefully directed and both teachers and scholars should derive much useful information and guidance from this small book. School Gardening is gaining in popularity year by year, and county after county is adopting it as a valuable practical asset to the curricula of their schools. In its bearing on the study that is conducted in the class-room it has proved itself of sterling value as a medium for the correlation of the Nature subjects.

It is a subject, however, that demands some amount of experience on the part of the instructor, and where this has been limited through uncontrollable circumstances the present work should do much to establish the teaching upon correct lines.

HORACE J. WRIGHT,
*Inspector and Lecturer in Horticulture
to the Surrey County Council.*

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SCHOOL GARDENING

CHAPTER I

THE SOIL



ARDENING is the oldest and at the same time the most interesting industry in existence. It offers pleasure to all and profit to many; there is a pleasure in the beauty of the flowers that may be grown; there is a great profit in the health-giving exercises it affords us, and in the knowledge that the observant gardener acquires in the course of his work. Further, it is an art which demands intelligence, energy, and patience; in fact, without these, success cannot be secured.

Success in everything depends on a clear comprehension of the underlying reason of things, and in no work of life is this so true as in gardening. The gardener who understands the reasons that underlie the operations he carries on in the garden has every opportunity of obtaining satisfactory results. On the other hand, it is quite possible to perform these operations in a satisfactory manner without any knowledge of the reasons which explain why they are done; yet, undoubtedly, a knowledge of the theory of gardening enables the worker to more thoroughly and intelligently carry out his practice. Theory without practice is useless, and practice

without theory is a drawback. The greatest measure of success is realised by the gardener who possesses a well-balanced knowledge of both.

Year by year, our gardens yield a wide range of produce and from this produce large quantities of nourishing food are derived. To the thoughtful it is clear that the source of this vegetable wealth is the soil ; it is the soil—the Mother Earth—that provides the material, which under the gardener's care and influenced by the forces of nature, is gradually transformed into flower or fruit or vegetable. It is this material, or plant food supply, that must receive our first consideration, for on its correct treatment rests the foundation of all gardening success.

The question of plant food leads us to the discussion of the formation of soil ; this will explain how plant food finds its way into the soil and, at the same time, illustrate the wonderful and persistent soil-making action that goes on every day in the garden. Soils differ widely, and in a small district it is quite possible that many different types of soil may be discovered ; this is due to the fact that soils are formed in the first place from the rocks of the earth, and in most instances owe their nature to the underlying rocks. Soils are made from these rocks by the weathering action of air, rain, wind, and frost. This weathering action has been progressing since the earliest days ; the production of soil is an operation that proceeds very slowly yet steadily through the years and centuries. It is going on now where the rocks of the mountains and hills are continuously crumbling under the action of the atmosphere, rain and wind, and frost. All rocks contain minerals, and these are

attacked by the oxygen of the air ; they are “ rusted ” or “ oxidised ” by this soil-making agent. This is the first stage in the decay of the rocks—strong and hard as they appear ; rain enters the rock crevices and carries with it the rock dust and fragments, while the frost performs no small task in forcing the rock fragments apart. Thus, in the course of the ages, soil is prepared

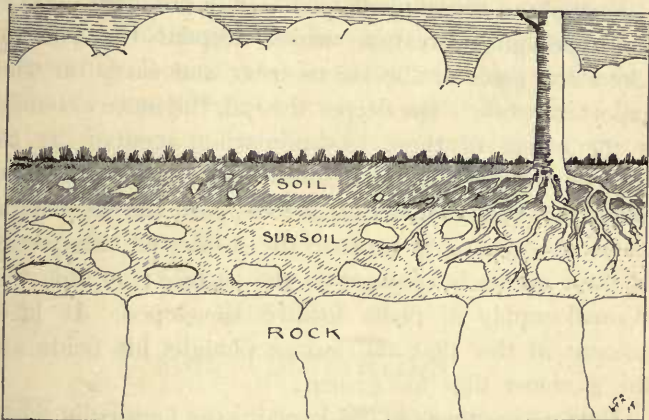


FIG. 1. SOIL FORMATION : ROCK, SUBSOIL, AND SOIL

with its supply of plant food formed from the broken and oxidised minerals of the parent rocks. This weathering action, or early stage in soil formation, does not affect the gardener to any great extent, for, on the one hand, the nature of the underlying rocks cannot be changed, and, on the other hand, the action takes a long time in its completion. Yet, it must be remembered that these natural forces—air, rain, and frost—are ever at work ; thus much can be done in treating the soil so that the action of these forces may be carried out as

extensively and as thoroughly as possible. The most important soil-making agent is the air with the gases it contains, and on these the gardener depends for the formation of suitable plant food. He must know that the mere *presence* of plant food is insufficient ; the food must be in a state ready for the support of plant life. It must be *available plant food*.

A supply of active plant food is only obtained by deep and thorough cultivation, which deepens the soil and allows the gases of the air to enter and carry on their important work. The deeper the soil, the more extensive is the action of these food-preparing agents ; at the same time, it provides the plant an opportunity of extending its root system in search of food. On the other hand, where the ground is imperfectly cultivated, the action of these agents is confined to the surface ; in this way a small supply of plant food is developed. It is on account of this that the farmer ploughs his fields and the gardener digs his garden.

Thus we see that the soil is really the factory in which the plant food supplies are developed ; the quantity of this plant food depends in the first place on the nature of the parent rock, and, secondly, on the thoroughness of the operations of cultivation. The plant can only take into its system the food that has been completely prepared, that is, it can only use active plant food. It must be remembered that while the soil contains plant food, there is a certain part of it that is useless as food to the plant ; however, this serves the very useful purpose of fixing the plant firmly in position.

Throughout the British Isles there is a wide range of

rocks, and under this name we include every form of the earth structure such as sand, clay, or granite. Each kind of rock accordingly gives a distinct type of soil. Thus we find sandy soils, clayey soils, and chalky soils, and since the minerals vary according to the rock, we shall expect to find different quantities of plant food in the soils formed from them. This is the fact. In the case of sandy soils, the amount of plant food is very small; here the gardener must use his intelligence and find out exactly what element must be added to the soil to ensure a sufficient supply for the crops he wishes to raise. In other words, he supplies the soil with suitable manures. These manures contain plant foods which are attacked by the food-preparing agents, and formed into an active food supply.

CHAPTER II

SOIL CULTIVATION

DIGGING. The object of all digging operations is to enable the forces of nature to carry on their work to the greatest extent; at the same time weeds are cleared from the garden. The digging of loams and clays should be done in late autumn or early winter and the surface should be thrown up roughly. This encourages the free admission of water, and as this expands under the influence of frost, the lumps are forced to pieces and the cultivator is able, when the time for seeding or planting comes in spring, to secure a friable, mellow tilth, or "season." The frost also kills many insects and other garden pests. The grower benefits

still further by frost action when the soil is thrown up roughly ; numerous air passages are formed, the soil is thoroughly aerated, and the latent food supplies are converted into a rich store of available nutrient matter. No gardener can reasonably expect any measure of success if this winter digging of medium or strong land is neglected or imperfectly carried out.

The ground should be forked again in spring to facilitate the preparation of suitable seed beds ; if, however,

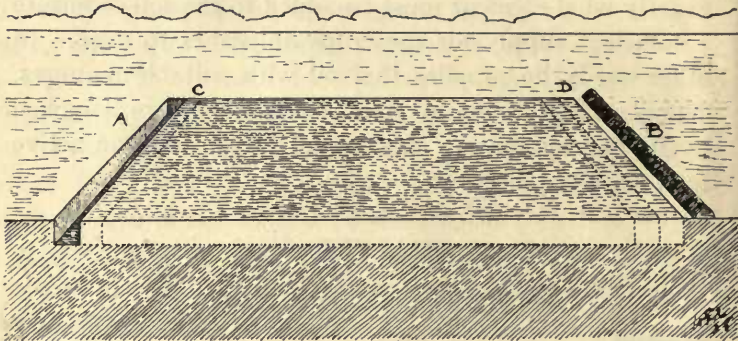


FIG. 2. DIGGING

The soil from the trench A is taken to B and the earth in C is thrown forward into the empty trench. When D is reached it is filled with the soil taken from A. Thus total displacement of soil is achieved.

the winter digging has not been performed, weeds are well established, and the actions of frost and air will be lost.

It is necessary, however, to consider sandy soils whose composition is such that they lack the power of holding moisture, and, consequently, cannot hold plant food in suspension. To dig these deeply and roughly in autumn would mean that the water would pass through them

more easily and more rapidly than before, and what little nutrient matter they contained would be washed away. Such light soils should be worked as early in spring as the weather permits.

In digging, great care must be taken to displace the soil. Form a trench, one spade in depth and two feet

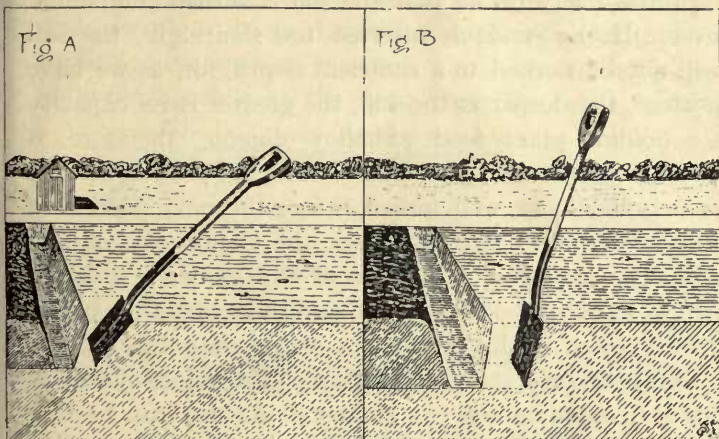


FIG. 3. INCORRECT AND CORRECT METHODS OF DIGGING

In Fig. A the spade is inserted too obliquely and hence the soil is moved to a less depth than it is in Fig. B in which the spade is placed correctly.

in width along one end of the plot, and by the aid of a wheelbarrow take it to the other end, or side if the plot has been divided longitudinally. The reason for this process is quite clear, for, as the soil is moved a spadeful at a time, until the piece of ground is dug, a trench is always open. This is filled with the soil that was taken in the first place from the opposite end of the plot. If

the soil has been evenly turned, the freshly-dug plot will present a level surface ; on the other hand, if the digging has been done unevenly and imperfectly, the surface will be uneven and untidy. The spade should be pressed into the ground so that the blade slants at an angle of about 60° ; the spadeful of earth that is raised should be thrown forward so that the soil is turned completely over. If the spade is inserted too slantingly, the soil will not be worked to a sufficient depth, for, as we have noticed, the deeper is the soil, the greater is its capacity for holding plant food. Shallow digging, therefore, is of little value. It is imperative that the bottom of each trench should be well forked before the next portion of soil is dug in. This increases the depth of soil and generally improves the value of the garden ; a larger supply of plant food is secured, and the roots of the plants ramify more readily and more deeply into the ground.

BASTARD OR FALSE TRENCHING. The object of trenching is to move the soil to a greater depth than can be done in digging. When it is done efficiently the depth will be two feet or three feet compared with the one foot of good digging. It is most desirable to bastard trench new ground, for, by means of this process, a deep soil is obtained, and the roots of weeds are easily removed. At the outset it is of the utmost importance to remember that in bastard trenching, the surface soil must not be buried ; neither must the subsoil be brought to the surface. The reasons are these ; the soil contains the plant food that has resulted from the action of the soil-making agents which has been going on for many years ; if this surface soil is buried it is useless, and its food supply

is lost. The subsoil contains plant food, but it is unavailable because it has been buried beyond the essential atmospheric influences, unless, of course, bastard trenching has been done regularly, when true or full trenching can be advantageously carried out, as will be explained. At first sight, it may appear difficult to prevent the subsoil from being brought to the surface; it is, however, quite simple to bastard trench a garden plot so that the surface soil is kept on the surface and the subsoil is kept underneath, while at the same time the entire mass of

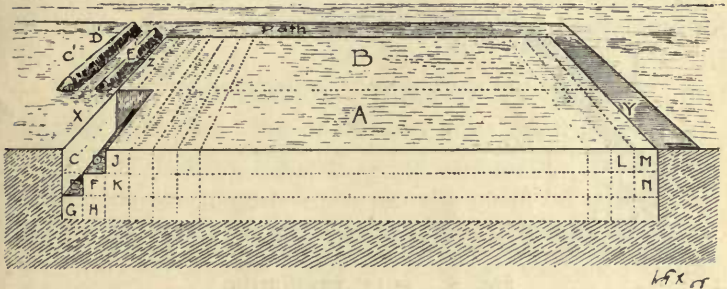


FIG. 4. BASTARD TRENCHING

soil is moved. This is made clearer by a diagram (Fig. 4); in the case of a large piece of garden the line should be placed across the plot so that two equal portions, A and B, are formed. At X dig a trench, two feet to three feet wide, and one spade deep; these sections C and D, are moved to C' and D'; this is surface soil. Next, take out E, the subsoil, to a depth of one spade and a width of two spades; place this earth by itself at E'. Now dig the bottom of the trench E a spit deep, but do not move the soil out; this ensures that the soil is loosened to a depth of three spits, or nearly three feet. The

trenching may now proceed; move the subsoil in F into the trench E, and the surface section J into C; dig the soil F in exactly the same way as G was worked. Then K is moved to F. By this method the surface layer and subsoil layer are worked forward section by section, and the relative position of these layers is not changed. However, the cultivation makes it possible for air to penetrate to a greater depth than in the case of ordinary digging, so that in time the subsoil is sweetened by aeration. When Y is reached, three sections of soil must

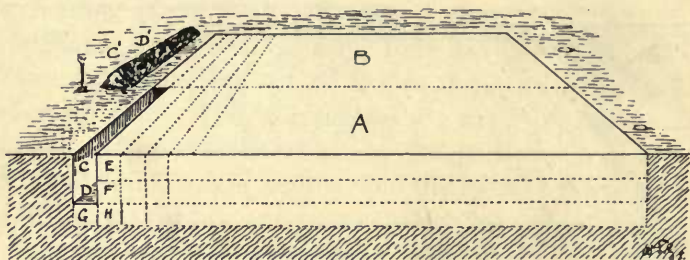


FIG. 5. FULL TRENCHING

Where a wheelbarrow is not available the plot to be trenched is divided as shown into the two parts A and B. Two spits of soil C and D are removed as indicated to C' and D'. The surface layer E is thrown into D and F takes the place of C. G and H are forked over as in Fig. 4. The earth from C' and D' is used to fill the last trench.

be brought from B in order to level the portion A. It is done as follows; the surface section P is placed in L, and the subsoil section under P is placed in N. Q is then moved to M and the same operations continued until Z is reached and three more sections of soil are required. These are obtained from the heaps taken from the first trench, but care must be taken to place the subsoil E in its proper place, viz., underneath. In trenching

a smaller piece of ground the division need not be made, and by means of a wheelbarrow, C, D, and E may be taken to the other end of the plot at once. The natural manure should be either spread on, or worked into the subsoil, but in no circumstances must it be covered more deeply than two and a half feet beneath the surface.

TRUE TRENCHING. When bastard trenching has been consistently and thoroughly done for three or four years the subsoil will have become so much ameliorated that substantial advantages will be secured by full trenching, in which process the positions of the surface and subsoils are reversed as is clearly shown in the diagrammatic illustration, Fig. 5.

SURFACE CULTIVATION. However energetically the digging and trenching operations have been carried out, the cultivation of the soil is not complete. Before the seed beds are prepared the ground must be forked and raked to remove weeds and secure a level surface of fine soil. When the crops are growing, the soil requires constant attention, and this calls for surface cultivation. The hoe is the implement for this purpose, and the object is to obtain a loose, dusty soil round the growing plants. It is clear to the thoughtful person that soils hold moisture, and that evaporation is constantly progressing under the influence of the sun's heat. It should be the gardener's aim to retain the moisture for the benefit of his crops; and surface cultivation, viz., hoeing, is the method he employs. These surface operations are especially necessary for certain crops, but to these attention will be drawn in subsequent chapters. While urging the necessity for looseness of the surface it will be opportune

to insist upon moderate firmness of the soil beneath, for root-hairs (correctly elongations of the cells of the fibrous roots)—true plant feeders—are not produced by the fibrous roots as freely in loose as they are in firm soil. Hence sandy lands must always be thoroughly trodden down before seeding or planting.

DRAINAGE. The presence of excessive moisture in the soil is injurious, retarding the germination of seeds and the development of root-hairs by making the soil cold and sour. Although many of the most important crops are essentially moisture lovers—Celery and Seakale to wit—any approach towards stagnation is fatal to success. Light, sandy soils drain naturally and often to excess unless they are consolidated by treading or rolling. Stronger mediums, however, with their infinitely greater power of holding moisture frequently demand artificial drainage, but it should not be resorted to except under compulsion as the operation is tedious and expensive. Such an elaborate process does not come within the scope of a school garden pupil who places reliance upon runnels and ditches to take away superfluous water. To ascertain whether drainage is necessary a hole three feet deep should be dug in the autumn and covered with boards to exclude rain; if, subsequently, water rises in the hole to within two feet three inches of the surface, the water table lies too high and the soil requires draining. Deep and thorough cultivation by improving the physical condition of the land reduces the necessity for artificial drainage.

CHAPTER III

GARDEN TOOLS



LN all gardens it is necessary to have sufficient, strongly made tools; each implement is designed especially for the work it is intended

to perform. It is also essential that the tools shall be kept perfectly clean, and this is only done by carefully removing the dirt from them immediately after using. Occasional oiling keeps the steel parts free from rust.

A complete equipment consists of spade, fork, Dutch hoe, draw hoe, rake, hand-fork, trowel, dibber and line. To these should be added a wheelbarrow, water-can, and syringe.

The greatest

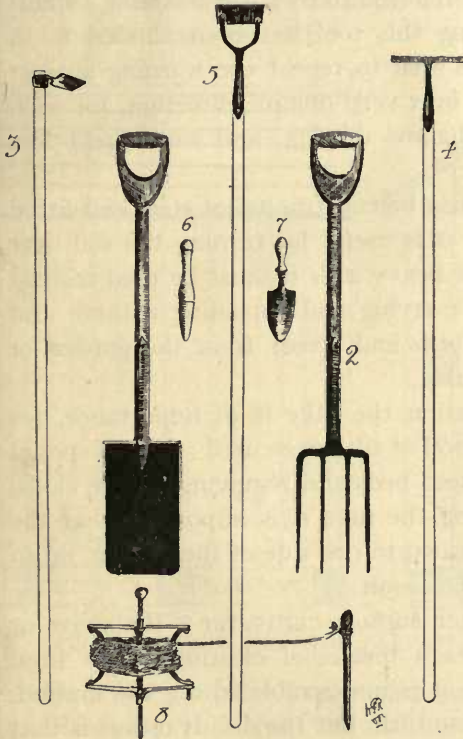


FIG. 6. A SET OF SCHOOL GARDEN TOOLS

1. Spade.
2. Fork.
3. Draw or cutting Hoe.
4. Rake.
5. Dutch or pushing Hoe.
6. Dibber.
7. Trowel.
8. Reel and Line.

amount of work, and at the same time the most important work, is undoubtedly performed with the spade which ought to be constructed of steel and fitted with a strong, ash shaft. It should have a D-shaped, rivetted handle. The spade is constructed for working the soil to a depth varying from nine inches to a foot; this depth is usually referred to by gardeners as a "spit." The method of using this tool has been alluded to in Chapter II, yet it is well to repeat the warning against inserting the spade in a very oblique direction, for such a practice means shallow digging, and consequent loss of plant food.

The fork should also be constructed of steel and fitted with an ash shaft; it is useful for turning the soil over lightly, and on some heavy soils it must be used instead of the spade. For carrying and spreading manure and the removal of rubbish and weeds from the garden or path it is indispensable.

In surface cultivation the rake is of importance, for by its aid a fine top soil or tilth is secured; it is of special value in preparing seed beds and removing stones, clods, and weeds. In using the rake it is important that the soil should not be drawn to one side of the garden, or an uneven surface is the result.

The hoe is another surface cultivator; the draw or cutting hoe provides a means of clearing weeds from growing crops when it is undesirable to dig the ground. It also produces a fine tilth, but the disadvantage is that the gardener walks forward and the weeds are often trodden into the soil. The hoe is of great service in the summer months when the surface weeds are flourishing

and the warm, gentle showers promote rapid growth. For the latter purpose the Dutch or push hoe is invaluable. If it is used in an oblique direction it tends to produce a hard layer of soil just beneath the surface. In order to avoid the formation of a sole the hoe should be used so that it cuts in and acts on two inches of soil. In using this tool the worker walks backwards and the weeds are not trodden into the soil.

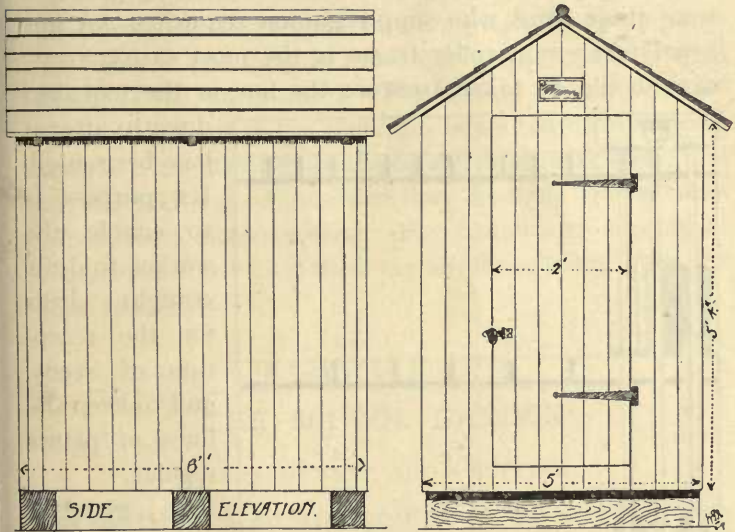


FIG. 7. FRONT AND SIDE ELEVATION OF TOOL SHED

Among the smaller implements the dibber is of value in planting; it is used for making the hole or station for the plant. In order to raise the plant with care a hand-fork or trowel is employed—the trowel is the more suitable. Either of these tools is to be preferred to the

dibber for planting. The hand-fork is useful for removing weeds and stirring the soil in the flower border where a hoe cannot be easily employed.

A garden-line is indispensable, or otherwise our gardens would not present that neat, orderly appearance which makes them so attractive. For small plots a line may easily be constructed by cutting two stout pegs and fixing to them a few yards of strong cord. In large gardens a much longer line is essential, and it is easily procured from those firms who supply garden requisites. A line fitted to an iron roller frame is the most satisfactory; care should be taken to store the line in the tool-shed

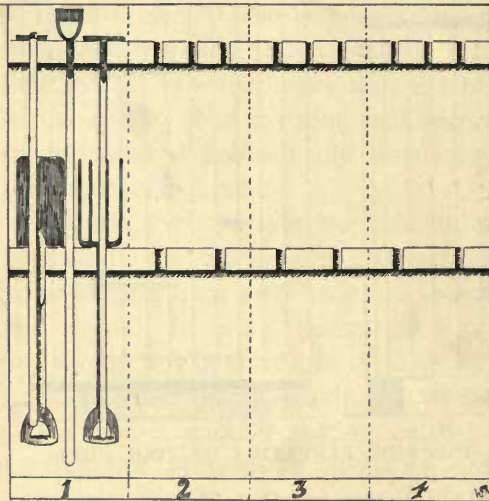


FIG. 8. ARRANGEMENT OF TOOLS ON THE INSIDE WALLS OF SHED

The interior is fitted with two wide and thick strips of wood which are cut so that the shafts of the tools fit into them as shown in the drawing.

directly after it has been used. Its purpose is to enable the worker to draw straight drills for the reception of seeds, and to keep the lines of plants regular.

A garden cannot be considered completely furnished unless there is a wheelbarrow; the clearing


operations of autumn and the manuring work of winter make it necessary that there should be some means of ready transport. A wheelbarrow saves time and labour and secures tidiness.

The housing of the tools is an important question. For this purpose a tool shed is needed, and a wooden one of sufficient size will fulfil every requirement. It should be firmly erected and strongly built; under the floor three battens must be placed so that the floor is kept dry. This arrangement is shown in the accompanying figure. The outside should be painted and the roof felted, tarred, and sanded. The interior should be fitted with racks, so that the tools can be stored neatly and in order. This may be accomplished in several ways, and any method is good provided that the tools can be taken out without inconvenience. Fig. 8 indicates a compact arrangement in which there is no encroachment upon the floor space.

CHAPTER IV

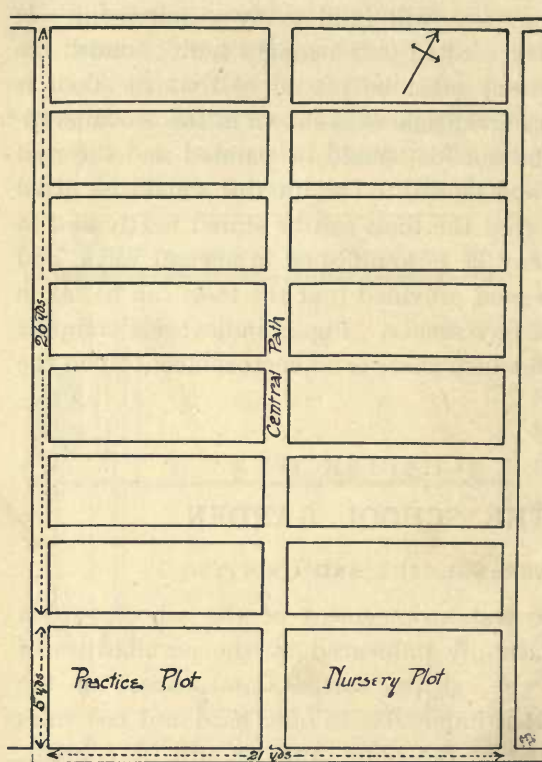
THE SCHOOL GARDEN

ARRANGEMENT AND CROPPING

HE general arrangement of the school garden is naturally influenced by the peculiarities of the size, shape, surface, and aspect of the garden site. It is impossible to offer hard and fast rules for the planning of the plots, and we will be content, therefore, with general considerations of the best conditions. The principal object of the cultivator must be to make the best use of the ground at his disposal.

This is not an easy matter, and some guidance is required.

There are two methods in practice in working school gardens, and there should be little hesitation in the selection of the better procedure. In the first, the communal plot system, all the pupils work on one common



plot; in the second, each worker is responsible for his own plot, however small it may be. There is much to be urged in support of each system, yet, where space permits, there must undoubtedly be greater responsibility and more occasion for individual effort in the one boy—one plot system.

FIG. 9. PLAN OF SCHOOL GARDEN GROUP

These plots should be arranged either in a single line

or double rows according to the shape of the ground. The latter system enables the instructor to more easily supervise the work of his pupils, and he can also conduct demonstrations with greater ease and more benefit to his class than in the case of the single row arrangement. However, on account of the shape of the site, the double row plan is often impossible.

The aspect of the ground is unalterable, yet naturally a southerly outlook is to be preferred. The length of the plots, however, must run approximately east and west. This ensures that the crops run slightly north-east and south-west in the rows, so that the warmth of the sun is received evenly by the crops throughout the day. This exposure is of great importance, especially in the case of tall-growing plants.

The area of each plot is, of course, determined by the size of the ground at disposal, and here again the best possible use must be made of the space. The size may vary between half a rod and a full rod. At least half-rod plots must be secured, and no boy worker should be made responsible for areas larger than one rod. Gardens ranging between these limits may be made very useful, and it is not necessary to adhere to exact fractional sizes. The age of the pupil must be considered ; juniors or first year boys should be given small plots and seniors made responsible for full-size plots. Where the plots are one rod in extent, a senior and junior may be employed, so that the latter is prepared by his apprenticeship for the unaided occupation of a garden in the following year. This is strictly a dual plot system, and is staunchly advocated by a few experienced teachers. The shape of the

plot is of the utmost importance, for in view of the fact that several representative crops must be grown, it is necessary to arrange each plot so that it shall be narrow in comparison with its length. Thus, 9 ft. by 30 $\frac{1}{4}$ ft. gives a rod plot, 6 ft. 9 ins. by 30 $\frac{1}{4}$ ft. a three-quarter rod plot, and 6 ft. by 23 ft. a half-rod plot. The exact measurement must, however, be governed by the shape of the ground to be plotted. Not only does such an arrangement lend itself to successful cropping, but also to ease of working, for the workers are able to tend the crops and cultivate the soil from either side of the plots.

Care must be taken to prevent the scholars from treading on the beds when the soil is wet, but when it is dry it is advantageous rather than the reverse, more particularly on light soils.

The paths between the plots should be made two feet in width, or in the case of scarcity of ground, never less than one foot six inches. This means that operations may be carried on without trampling down the edges of the plots. The main or central path should be three feet wide. Abundance of path room means ample working space, yet this consideration is subject to the size of the site. The edges of the plots may be neatly stoned or set with laths according to the possibilities of local supply. Where no edging is forthcoming, the spade and line must be used to square off the sides of the plots. Perhaps the latter procedure is to be recommended since stone edges afford a harbourage to vermin, but at the same time they add a neatness to the garden generally.

THE SEED PLOT. In every school garden provision

must be made for a seed plot or a nursery plot, or both. Each should be a rod in area, and reserved for the working of the entire class. Plants that require transplanting should be sown here, since there is insufficient space for such operations on the ordinary plots.

The propagation of plants by cuttings, layers, and division may be practised in the seed plot or nursery.

THE PRACTICE PLOT. The practice plot must be at least one rod in size, and nothing should be grown in it. The preparatory operations of digging, trenching, and drill-drawing should be taught here ; in fact, all necessary work should be rehearsed on this plot. There is nothing more detrimental to school gardening than the wrong use of implements, and the practice plot offers a valuable help in preventing and correcting bad methods. The practice may be carried on prior to the general advance of spring work on the plots, and demonstration should precede each important operation. For the junior students such work is of the greatest value, and secures the conditions that lead to success in the individual work on the plots. If a plot larger than one rod can be secured for this purpose, so much the better.

CROPPING. The arrangement and variety of the crops grown in the school garden will naturally depend on the size of the plots. On the large plots a representative cropping is easily secured, while in the smaller plots intercropping must be resorted to in order to make the best use of the space at disposal. At the same time crowding must never be permitted. The cropping plan (Fig. 10) indicates how a rod plot may be cropped, and with slight modification in the number of rows of each

kind it may be carried out in the case of the smaller plots. On small plots, celery cannot be grown, but it

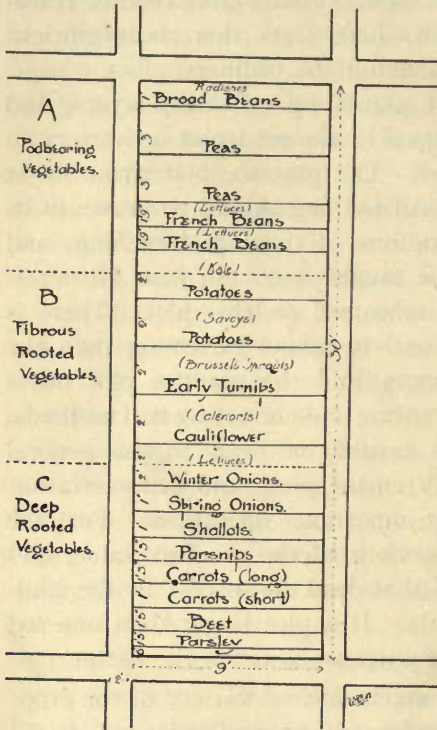


FIG. 10. CROPPING PLAN

This plan is adapted from a suggestive scheme by Mr. John Wright, V.M.H.

certainly should find a place in the rod plot; lettuces may be intercropped with it. Potatoes may be intercropped in alternate rows with winter greens, but if the former are tall growing varieties, the system is not to be recommended. Whenever potatoes are to be intercropped, care should be taken to plant the rows well apart, so that the earthing up and lifting of the tubers is not interfered with. Turnips, Spinach, Lettuces, and Radishes may be grown between Peas and Beans.

SUCCESSIONS. In cultivating and cropping of all gardens it is necessary to consider three important points. Firstly, a succession of crops must be secured so that a continuous yield of produce is obtained; secondly,

care must be taken so that the autumn and early winter operations of digging, manuring, and trenching, may be carried out; and, thirdly, provision must be made for a rotation of crops in successive years so that exhaustion of the soil is prevented. Little difficulty should be experienced in dealing correctly with each of these considerations. Here is a general guide to rotational cropping.

1. Beans and Peas should be followed by Potatoes, Turnips and Greens.
2. Potatoes, Turnips, and Greens should be followed by Onions, Parsnips, Beet, and Carrots.
3. Onions, Parsnips, Beet, and Carrots, may be followed by Beans and Peas.

This rotational arrangement may be followed out in a sectional scheme as shown in Fig. 10, or it may be worked out in the usual way by keeping a cropping plan each year, and planting crops the following season according to the table given.

For successions, viz., for the purpose of obtaining a continuous yield, the following points are useful:—

1. Peas and Beans may be followed by Lettuce or Turnips
2. Onions may be followed by Broccoli.
3. Spring Cabbage may be followed by Peas or Turnips.
4. Winter Lettuce may be followed by Cauliflower.
5. Peas or Onions may be followed by Spring Cabbage.
6. Early Potatoes may be followed by Brussels Sprouts or Peas.

The following table is a guide for planting the various crops demanded by the school plot. Local conditions will naturally affect the time of sowing; the nature

of the soil will slightly modify the depth of the drills, and all the influences of garden life will have something to do with the period that elapses before the plant arrives at maturity.

<i>Vegetable.</i>	<i>When to Sow.</i>	<i>Depth of Drill.</i>	<i>Distance Apart.</i>
Cabbage, Spring	August	$\frac{1}{2}$ inch	15 inches
Cabbage, Summer	March and April	$\frac{1}{2}$ inch	18 inches
Borecole	March to May	$\frac{1}{2}$ inch	24 inches
Brussels Sprouts	Feb. and April	$\frac{1}{2}$ inch	30 inches
Broccoli	Mar. to May	$\frac{1}{2}$ inch	18 inches
Cauliflower	Feb. to April	$\frac{1}{2}$ inch	24 inches
Savoy	March to May	$\frac{1}{2}$ inch	18 inches
Lettuce	March to July	$\frac{1}{2}$ inch	9 inches
Celery	Feb. and March	$\frac{1}{2}$ inch	9 inches
Spinach	March to Sept.	1 inch	8 inches
Beans, Broad	Feb., Mar., Nov.	3 inches	6 inches
Beans, Dwarf	May	3 inches	12 inches
Beans, Runner	May and June	3 inches	12 inches
Peas	Feb. and May	3 inches	3 to 6 inches
Beet	April and May	$1\frac{1}{2}$ inches	9 inches
Carrots	March to July	1 inch	9 inches
Turnips	Feb. to Sept.	$\frac{1}{2}$ inch	9 inches
Parsnips	Feb. and March	1 inch	12 inches
Potatoes	March to May	4 to 6 inches	12 to 15 inches
Onions	Feb. to Ap. & Aug.	1 inch	4 to 9 inches
Leeks	March	1 inch	12 inches
Shallots	February		9 inches
Radishes	Feb. to July	1 inch	Broadcast
Vegetable Marrow	March and April	$1\frac{1}{2}$ inch	One plant
Parsley	March to June	$\frac{1}{2}$ inch	9 inches
Tomatoes	Feb. and March	$\frac{1}{2}$ inch	24 inches
Cucumber, Ridge	March and April	1 inch	24 inches
Mustard & Cress	March to June	Surface	Broadcast

The following table indicates the crops that should be grown in each plot :—

Beet	¹ Brussels Sprouts	Lettuce	Potatoes
Borecole	Cabbage	Mustard and Cress	Radishes
Beans, Broad	Carrots	Onions	¹ Savoy
² Beans, Runner	Cauliflower	Parsley	Shallot
¹ Broccoli	² Celery	Parsnips	Turnips
	Dwarf Beans	Peas	


¹ These crops should be grown on a reserve plot where the gardens are very small.

² On small plots these crops should be omitted, or in the case of Runner Beans, a few plants may be placed at the corners.

On the nursery plot the following may be grown :—
Vegetable Marrow, Ridge Cucumber, Rhubarb, and all
Winter Greens.

CHAPTER V

MANURES

HE continuous growing of crops naturally results in the exhaustion of the soil ; day by day each plant is assimilating food from the soil, and at the end of the year the garden is deficient in active plant food. The keen gardener endeavours to prevent this weakening of the feeding power of the soil, and by means of natural and artificial manures, he carefully maintains and improves the condition of the soil. On the other hand the feeding of the soil may be neglected ; then partial starvation of the plants is inevitable and certain, and the value of the ground is lessened. Money invested on manures is money well spent ; false economy in this direction is the path to failure.

We have already shown that the soil is simply a food storage for the plants, but before the nutrient matter is available it must be soluble, since plants feed by imbibition alone. There may be a large supply of insoluble food matter, but this is of no value except as a *reserve* supply which, under the combined action of soil working, water and air, is transformed into an *active* supply.

The three most important constituents of this food supply are nitrogen, phosphoric acid and potash, and manures containing these three important foods are readily obtainable.

NATURAL MANURES. These are widely employed, and the best known form consists of farmyard manure or the refuse of the stable. This manure contains nitrogen, phosphoric acid and potash in such a state that they are easily formed into a soluble food. One ton of farmyard manure contains about 10 or 12 lbs. of nitrogen, 4 to 9 lbs. of phosphoric acid and from 9 to 15 lbs. of potash. The nitrogen is chiefly present in the form of ammonia, which causes the characteristic smell of farmyard manure ; this compound is very volatile, and on this account a great proportion of this valuable food is lost when the manure is exposed to the atmosphere.

Farmyard manures should be used to the extent of three or four barrow-loads per square rod ; it may be spread over the surface and thoroughly dug into the soil a spade deep, but the best practice is to work it into the second layer or spit when the ground is being trenched. In strong soils this should be done in early winter so that the "breaking-down" action of the food compounds may commence early ; in light, sandy lands it must be done in spring. It is unwise to place fresh stable manure in the ground at any time as it is liable to injure the roots ; it should have been previously sweetened by stacking and turning.

The compost heap provides the gardener with a convenient source of valuable plant food. It should be formed in an out-of-the way corner of the garden and built up from time to time of plant refuse mixed with quicklime ; to these may be added dead leaves. In the course of time the vegetable matter decomposes and provides a valuable manure for use during the next trenching operation.

A similar, yet quicker, method of manuring the garden is provided by "digging in" a quickly-grown green crop; thus, in autumn, Turnips may be sown on a spare plot and then in the following spring dug deeply into the ground.

ARTIFICIAL MANURES. The question of artificial manures is of great interest and illustrates how completely scientific knowledge is brought to the gardener's assistance. It will be observed that natural manure contains plant food in more or less constant proportions, yet, different crops require different foods, and then, again, different soils contain varying amounts of these foods. In this way, by means of "artificials," the gardener who studies the nature of his crops and the peculiarities of his soil is able to provide the particular food that is needed, and also in whatever quantity he pleases. For instance, it has already been stated that nitrogen is an essential plant food; it is known that the atmosphere contains an enormous supply of this element in a free state, yet, except in the case of one family of plants—Peas and Beans—this air supply is quite inaccessible to plants. The legumes, or pod-bearers, are provided with nitrogen nodules on their roots; these nodules contain minute organisms that are able to store up nitrogen for the plant's use. Such nodules are to be found on the roots of Peas, Beans, Lupins or Clover, and they are extremely interesting instances of the action of plants in obtaining food.

The nitrogen of the air is thus unobtainable by the majority of plants; nitrogen, therefore, must be obtained from the soil, in which it is present in the form of nitrates.

A nitrate, of which sodium nitrate is a useful example, is really, as far as the plant is concerned, a nitrogen carrier. In performing this work, sodium nitrate is a most useful artificial manure ; it is easily soluble and therefore available for plant food. It should be remembered that great care is necessary in the correct use of this manure ; it may be placed on the surface when seedlings

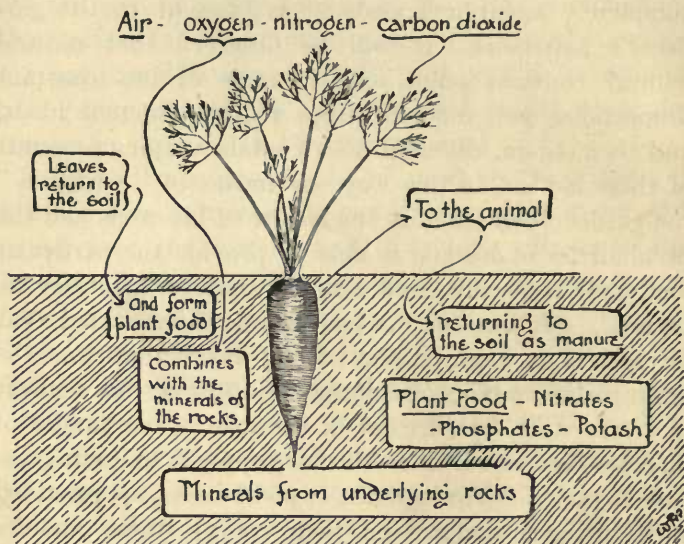


FIG. 11. THE RELATION OF THE PLANT TO THE SOIL

are developing—soon after they have used up the storage of food contained in the parent seed, half an ounce per square yard being ample at this stage. It is helpful in the growing of all crops at the rate of one ounce to the square yard, or a similar quantity to a gallon of water when utilised in liquid form. In no

circumstances must it be used on land deficient in potash and phosphates.

Phosphoric acid is carried to the plant's root system in the form of superphosphates, bone dust, and guano. These compounds are extremely useful, and the garden plots should be dressed with it in early spring, for they are not so readily soluble as sodium nitrate. The dressings may be scattered into the trenches as digging proceeds, or distributed on the land and raked or hoed in to a depth of two or three inches. Of the first and second named, from three to four ounces to the square yard may be given; of the third named, two ounces.

Potash is carried to the plant in the form of nitrate of potash, sulphate of potash, muriate of potash, and kainit; it is an indispensable food supply. It is easily retained in the soil and not so easily washed out and lost as is the case with sodium nitrate.

The first named is far more valuable as a stimulant than as a food; the second and third named are valuable for spring application, the former usually producing the better results; while the fourth must be applied in autumn when it has substantial value as a fungicide and an insecticide as well as a food.

These chemical manures are mixed in proportions varying according to the crop and also to the amount of lime in the soil. The presence of lime is an important consideration because it helps to a great extent in the proper production of a food supply. Here are tables of mixtures suitable for land rich in lime and also for soils deficient in that substance.

A. FOR SOILS RICH IN LIME :—

Phosphates	Superphosphate of Lime	4 lbs.
Potash	Kainit	2½ lbs.
Nitrogen	Nitrate of Soda	1½ lbs.

8 lbs. for 1 rod of land

B. FOR SOILS DEFICIENT IN LIME :—

Potash	Sulphate of Potash	. ¾ lb.
Nitrogen	Nitrate of Soda	. ¾ lb.
Phosphates	Basic Slag	. 2½ lbs.

4 lbs. for 1 rod of land

It is of the utmost importance that the soil should possess a fine tilth, otherwise the distribution of these artificial manures is not even—their action is local, and it is hindered greatly by lumpy soils.

Lime is of great value on account of its action in producing free ammonia when it comes in contact with nitrogenous matter. In this way it helps the decay of stable manure, but it is imperative that it should be raked into the soil *after* the natural manure is dug in.

Otherwise, if it is mixed with stable manure before it is used, ammonia is liberated and evaporates, the nitrogen of the manure being thereby lost. Lime also

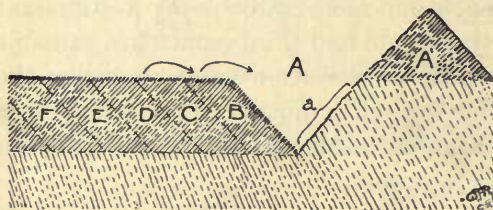


FIG. 12. APPLYING ARTIFICIALS

A trench is opened at A and the soil thrown to A'; the manure is then dusted on the sloping surface (a) of the trench. Section B is thrown forward and the treatment continued.


sweetens the soil and performs a useful work in killing many forms of pests.

When natural manures are exclusively relied upon to maintain the supply of food in the soil, a heavy dressing of lime must be applied in the autumn or winter at intervals of six years. It will act upon the masses of humus, free the nitrogen contained therein, and restore the ground to a state of fertility.

In general, artificial manures should be applied early in the year, and in many cases a second dressing may be made during the season. Full directions as to these applications will be made in reference to each crop that needs, or benefits by, concentrated foods.

CHAPTER VI

GERMINATION AND SEED SOWING

ERMINATION is the first stage in the development of the plant from the seed ; this development is only possible under certain fixed conditions, viz., air, warmth, and moisture. It should be observed that light is not essential, although in the growth of the matured plant it is necessary for healthy development.

The seed is a tiny food store protected by a seed coat ; it contains the growth shoot or germ which is ready to develop when the food store is acted upon, by the influence of air, warmth, and moisture. If these conditions are absent the seed remains dry and hard ; it becomes soft and moist when germination takes place. Place some pea seeds in moistened flannel, store them in a warm place and the following changes will be observed :—

First, the seeds swell, and this is caused by absorption of moisture; second, after several days the seed coat splits and the tiny root shoot, or *radicle*, makes its appearance and gradually develops; and, third, soon the stem shoot, or *plumule*, is seen and rears its curved point

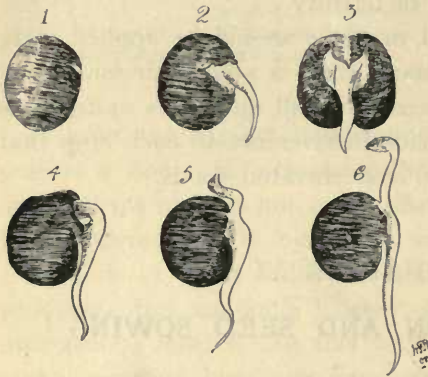


FIG. 13. GERMINATION OF PEA

1. Appearance after immersion in water—the skin of the seed is bursting. 2. Radicle developing. 3. Full view of 2. 4. Appearance of plumule. 5. The plumule freed from the cotyledons. 6. The radicle and plumule well developed. After this stage the seed disappears and the support of the plant comes from the air (as assimilated by the leaves) and from the soil (as secured by the roots).

upwards. However, there is a limit to this development, and after a week or so the young pea plant dies. Why? Simply because it is starved; the store of the seed is exhausted; the plant has arrived at the stage when outside help is required, and there is no food in the flannel for its support.

These stages of germination proceed in a similar way in the ground except

that there is a rich store of food available for the young plant when its roots and leaves are sufficiently developed. Therefore it is essential to prepare suitable seed-beds so that the germinating process may progress unhindered. The presence of air in the soil is secured by thorough working; in this way small passages are formed and air can enter freely. Warmth

depends partly on the weather, on the nature of the soil, and the extent of its cultivation. A heavy soil that holds an excess of moisture is a cold soil, and germination is consequently delayed ; and the same may be said of a soil that has been imperfectly cultivated. Moisture is only retained in the soil by creating a fine tilth on the surface of the seed bed ; if a rough surface soil is allowed to remain a great amount of moisture is lost by evaporation.

Thus in preparing the seed beds these considerations must be carefully borne in mind and the work thoroughly carried out. The ground should have been well dug in autumn and thus exposed to frost action. In spring it should be forked deeply and the surface will crumble down into a fine soil ; finally, the surface should be trodden down and evenly raked. These operations are of the greatest importance, for they secure the essential conditions of germination. The surface is fine and loose—thus air can enter freely and moisture is retained ; excess of moisture has escaped—thus the soil is warm ; a fine, but firm base has been formed—and in this way the even germination of the seed and the vigorous growth of the seedling are assured.

The seed bed having been prepared, sowing may proceed in due season, and this depends on the nature of the crop that is to be sown. At whatever time of the year the sowing takes place, an endeavour should be made to secure a fine day. Not only can the operation be carried out more cleanly and more pleasantly, but also with more profit, for a wet soil retards germination. At the same time, it should be borne in mind that moisture

is essential, and in dry weather water must be applied as necessary.

Seeds are usually sown in drills at depths varying with the size of the seed. For this purpose, the

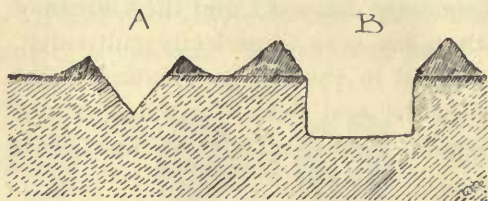


FIG. 14. FORMS OF DRILLS

A.—Triangular drill, as formed for the small seeds. It is made with a hoe, and the soil is arranged evenly on both sides as shown. Its depth varies with the nature of the seed to be sown.

B.—A flat-bottomed drill as made for Peas and Beans.

the line should be fixed firmly across the garden; the drill is then made by means of the draw-hoe, which is held so that a corner of the blade displaces the soil. Great care must be taken to secure a straight drill of even depth; otherwise the plants will grow irregularly. In sowing very small seeds, which require shallow drills, a thin stick may be employed for drilling: *e.g.*, Mustard and Cress may be treated thus in $\frac{1}{4}$ -inch drills.

The seed should be sown evenly and thinly; here, mention must be made of the importance of thin sowing.

There is always a tendency, even among gardeners, to sow thickly. This results in sheer wastage, not only of seeds, but also of plants and labour. Plants require breathing and feeding space,

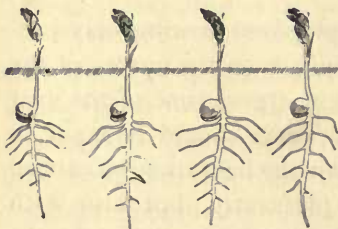


FIG. 15

THE RESULT OF THIN SOWING

and the greater the number of plants crowded into a given space, the less air and food will each obtain. It

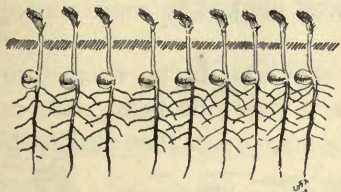


FIG. 16

THE RESULT OF THICK SOWING

is better to grow a small number of healthy, well-developed plants than to crowd the ground with weaklings. The mistake of thick sowing may be corrected to a certain extent by thinning, but

this is rarely carried out to a proper extent.

When the seeds are evenly distributed in the drills the soil should be lightly and smoothly raked over; care must be taken not to rake to such a depth that the seeds are moved, or otherwise an irregular row of plants will result. A planting stick must be placed at one end of the row and a label bearing the name of the seed and date of sowing at the other. In due course the seedlings appear, but before this, in many cases it is necessary to protect the rows from the attentions of birds, slugs, snails, and mice. The birds attack Peas, Cabbage seedlings, and Radishes chiefly, and these should be secured from their ravages by means of wire guards or cotton. Peas should never be left without some form of protection. Slugs and snails are prevented from devouring the succulent leaves of Lettuce or Peas by surrounding the crop with lime or soot. Mice often prove a great source of annoyance and nibble pea seeds below the surface; they are also fond of Sweet Pea growths. Where these small vermin are present the seeds should be damped and shaken up in red-lead

before sowing, and traps must be placed where it is known that they visit the growing shoots of Peas. Often birds are blamed for the havoc worked by mice among the Peas.

As the seedlings develop they should be thinned to the necessary distance apart, a safe rule being that no plant shall touch its neighbours, or, if they are to be



FIG. 17

FORMS OF PROTECTION FOR SEEDS

transplanted, they should be carefully lifted and placed in their new stations. In doing this, earth must be kept on the roots, or else the rootlets will be broken.

CROPS FOR TRANSPLANTING :—

Borecole	Cabbage	Savoys
Broccoli	Cauliflower	Vegetable Marrows
Brussels Sprouts	Leeks	Lettuces

CROPS THAT ARE GENERALLY SOWN WHERE THEY WILL MATURE :—

Beans	Onions	Turnips	Cress
Beet	Parsnips	Parsley	Radishes
Carrots	Peas	Mustard	

N.B.—It is possible to transplant Beans, Peas, Beet and Onions.

CHAPTER VII

GREEN VEGETABLES

CABBAGE, SAVOY, BORECOLE, BRUSSELS SPROUTS,
CAULIFLOWER, COLEWORTS



GREEN vegetables are among the most important of garden produce. They are sufficiently hardy to provide a continuous yield of crops which are welcome to the table during each month of the year. Their value does not lie in high nutritive properties, but in the excellent cleansing and purifying effect which they have on the blood.

CABBAGE. This vegetable should find a place in every garden. With good cultural attention and successive sowing and transplanting, well-hearted plants may be obtained from spring to the end of summer. Seed for the former crops is sown late in July and in August, and the plants are transferred to their permanent positions in September and October. It is probable that they will have had to be pricked out from the seed plot to a nursery bed before they are ready for the final positions. It is a good practice to plant out on a freshly prepared piece of ground. During the winter little growth is made by the young plants, yet in the opening of the year the Cabbages make headway. In February, nitrate of soda should be distributed on the surface at the rate of 1 oz. per square yard. This accelerates growth, and tender, firm-hearted Cabbages should be ready in spring. Seed for summer Cabbages is sown in March and April, and the plants are transplanted in May. The nitrate

treatment should be carried out in June in precisely the same way as recommended for the spring crop. Summer cabbage should be ready for cutting in July and August.

The seeds of the several members of the Cabbage family must be

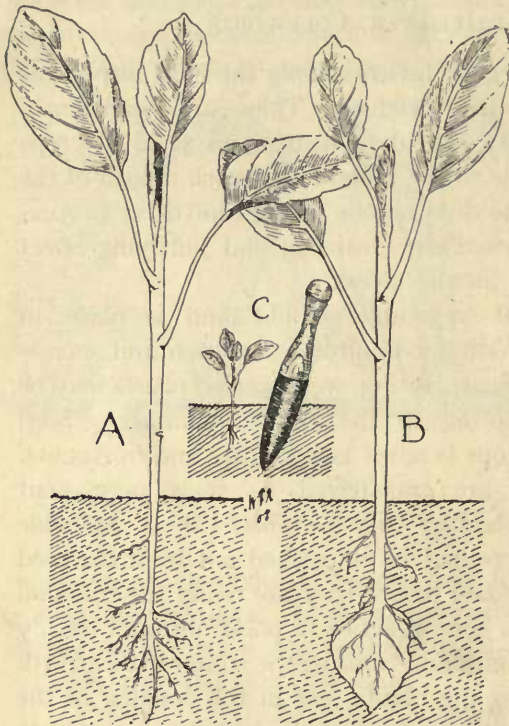


FIG. 18. PLANTING

A.—Correct method. B.—A bad method with cavity left at the roots. C.—Shows how the dibber is used in planting.

sown thinly, and the young plants should be transplanted directly they are large enough to handle. If the seed beds are crowded and transplanting is delayed, the result is a crop of weak plants. Transplanting demands careful work. The young plants should be lifted from the seed beds when the soil is in a moist state, and a little ball of earth must be kept round

the roots of each plant. The young plants are then

placed into a hole, sufficiently deep to accommodate the roots which should be spread with an outward and slightly downward tendency; the soil must be firmly placed about them. Cabbages should be planted out fifteen to eighteen inches apart, and the rows should be similar distances asunder.

THE BEST VARIETIES TO GROW. For spring cutting :—
Flower of Spring and Ellam's Early.

For summer use :—Sutton's Imperial, Tender and True, and Main Crop.

SAVOYS. The Savoy is an important winter vegetable. It requires a thoroughly prepared soil and ample space. The seeds should be sown in April or May, and the young plants must be planted out in July. The crisp, firm-hearted produce is ready for cutting in the winter. Dwarf Green Curled is an excellent variety, and the plants should be set fifteen inches apart in rows eighteen inches asunder.

BORECOLE, OR KALE. Borecole is hardy and easily grown, and has the further advantage of not being so liable to club as other members of the family. The seeds are sown in March and April and transplanted in July; the plants should be quite two feet apart in all directions. A fertile, but not too rich soil is necessary. The sprouts should be picked when they are quite fresh and tender, so that a continuous yield is prompted. During the development of the plants the hoe should be kept at work along the rows. Cottagers' is one of the most useful and prolific varieties.

BRUSSELS SPROUTS. This popular member of the Cabbage family provides the table with a favourite

vegetable. It requires deeply and generously prepared soil, and also continuous attention during growth. A sowing should be made in March, and directly the plants are large enough to stand removal plant them out two and half feet apart each way. Especially in the case of Brussels Sprouts the plants become weak and spindly when transplanting is delayed. Hoe continuously between the plants and remove the larger leaves at the base of the stems so that air and sunlight can reach the sprouts. Excellent varieties to grow are Exhibition and Wroxton.

BROCCOLI AND CAULIFLOWER. These two vegetables are very similar in form and habit of growth. Broccoli is a hardy vegetable, and it is obtained in successions for winter and spring use by making sowings from March to May. It demands a firm soil which was heavily manured for the preceding crop ; hence it follows admirably upon autumn sown Onions. If the plants are set out in loose, rich, deep land, such as is especially suitable for Cauliflowers, the growth is too rapid in autumn and the consequent soft growth will not withstand the rigours of the winter. On the contrary plants set with a dibber on firm ground grow slowly and hardily and rarely suffer. The distance of planting varies somewhat with the variety, eighteen by twenty-four inches usually sufficing. As has been suggested Cauliflower must have a rich and friable soil as rapid progress is desirable. Seeds should be sown in March and the plants placed in their permanent positions in July. The heads are ready in the autumn. Where summer Cauliflower are desired, the sowings must be made in August, and transplanting should take place

as soon as the plants are large enough to be moved. Autumn Giant is the finest variety for general use, and the plants should be allowed twenty-four inches in all directions.

GENERAL NOTES ON THE CULTURE OF THE CABBAGE FAMILY

Great care must be taken to sow the seeds and move the young plants in the proper season ; neglect of these considerations often means a poor, worthless crop. Frequently Cabbages run to seed or "bolt." This may be due to poorness of the soil, or to allowing the plants to remain crowded in the seed or nursery beds.

COLEWORTS. This is an exceedingly useful member of the family, for the plants grow rapidly and turn in in September when the summer cabbages are passed. Seeds should be sown in June or July, the young plants moved in August, a distance of twelve inches being allowed in all directions.

CULTURAL TABLE

<i>Vegetable.</i>	<i>Time to Sow.</i>	<i>Time to transplant.</i>	<i>When ready.</i>
CABBAGE. For Spring	July & Aug.	October	April, May.
For Summer	Mar. & April	May	Summer
SAVOYS	Mar. or April	July	Autumn & Winter.
BORECOLE	Mar. or April	July	Winter & onwards.
BRUSSELS SPROUTS	Mar. or April	July	Autumn & Winter.
BROCCOLI	Feb. to May	July	Winter & Spring.
CAULIFLOWER	Apr. or May	July	Autumn
COLEWORTS, ROSETTE	June & July	August	Sept. & Oct.

PESTS OF THE CABBAGE FAMILY AND THEIR TREATMENT

Among the pests that attack the members of the Cabbage family the best known are the Gall Weevil, Club

Root (Finger and Toe, Anbury), and the Large White Butterfly. The Weevil and Club Root attack the roots

and stems of the plants, and the Large White Butterfly deposits its eggs on the leaves and from these emerge the caterpillars.

THE GALL WEEVIL (*Ceutorhynchus sulcicollis*). This pest produces small swellings at the base of the stem and frequently these spherical growths may be found just below the surface of the soil.

The trouble is brought about by a small weevil beetle which places its eggs in the tissue of the outer skin of the stem. This egg develops into a white grub which feeds on the plant tissue. In due course the grub passes into the pupal stage and eventually the perfect insect emerges to carry on its destructive work.

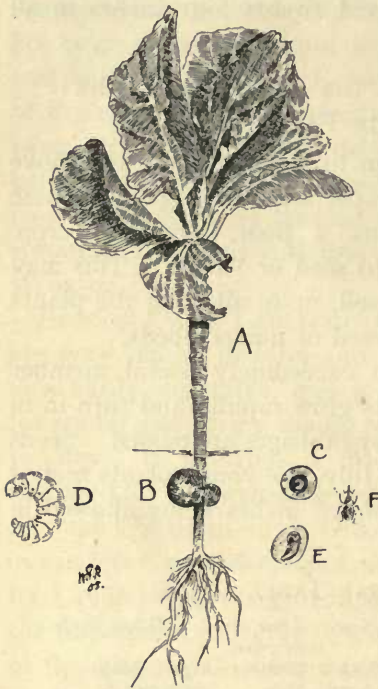


FIG. 19. GALL WEEVIL
(*Ceutorhynchus sulcicollis*)

A.—A young Cabbage plant with galls shown on lower part of stem at B. C.—Section of gall showing the grub of the weevil inside. D.—Enlarged drawing of the grub. E.—The pupal form. F.—the beetle.

The Cabbage is subject to this pest and little can be done to remedy the evil except lifting the plants when

very young, cutting away the galls, and drawing the roots through a puddle of soot and clay. If the plants are again planted little harm follows the operation.

The Gall Weevil is a beautifully marked member of the beetles ; it is quite harmless. It is the larva which makes its home in the plant that causes the mischief. Often in fully developed plants a small hole may be found in the side of the swelling. This aperture is the exit and indicates that the larva has left the plant to take up its pupal quarters in the surrounding soil. In this state it is protected by an earthen case. It is good practice to dress the ground with fresh gas-lime at the rate of 1 lb. or 1½ lb. to the square yard, leaving it on the surface for a fortnight and then forking it well in. In no circumstances must the ground be cropped for six weeks after such an application.

CLUB ROOT (*Plasmodiophora brassicae*). This fungus causes serious injury when it is established in the garden. It is common to all the members of the Cabbage family (including Turnips) yet the Borecoles are rarely attacked. This pest is caused by spores which are able to rest in the soil in a dormant state for a considerable length of time. If such an infested area is planted with Cabbages, the spores immediately avail themselves of the plants as a means of development. As germination takes place the roots of the plant attacked are contorted into large masses of slimy matter. The presence of this fungoid pest is indicated by the unhealthy appearance of the leaves which, on account of the interference of the spores on root action, are unable to develop.

With care and prolonged exertion the pest may be

exterminated. Every infested plant must be burned. If the plants are thrown on the soil to decay, the spores

pass into the ground and develop when a congenial host plant is grown. When the plants are cleared the ground must be thoroughly dressed with freshly slaked lime, of which sufficient must be applied to cover the surface to a depth of half an inch; it should be pointed in with a fork at the end of eight days. Gas-lime is also excellent and should

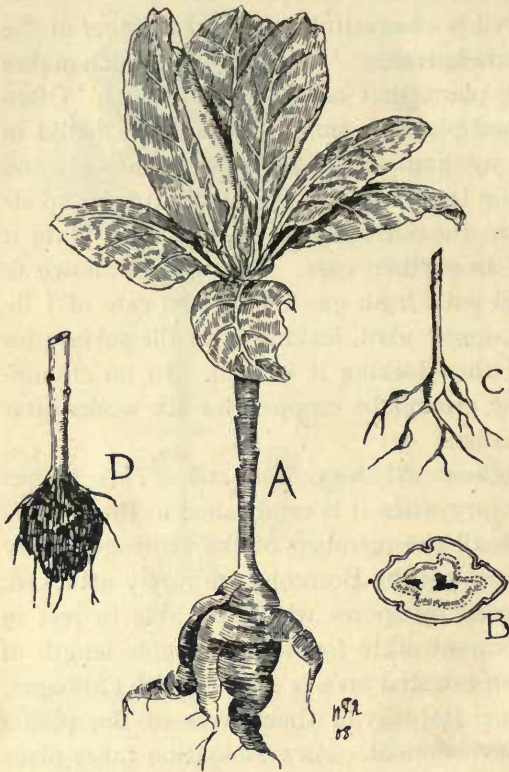


FIG. 20. CLUB ROOT
(*Plasmodiophora brassicae*)

A.—Young Cabbage plant in an early stage of the disease. B.—Section through root. C.—First phase of Club Root. D.—The last phase and complete rotting of roots.

be applied as advised under Gall Weevil.

It is, however, an extremely difficult matter to ensure the destruction of every spore by either of these methods, yet with persistent efforts the pest may be kept well within bounds. No member of the susceptible family must be grown on infested land for at least two seasons.

THE LARGE WHITE BUTTERFLY (*Pieris brassicae*). This well-known insect is a less troublesome pest than the two foregoing sources of trouble. Its ravages are carried on above ground. The Large White is a widely

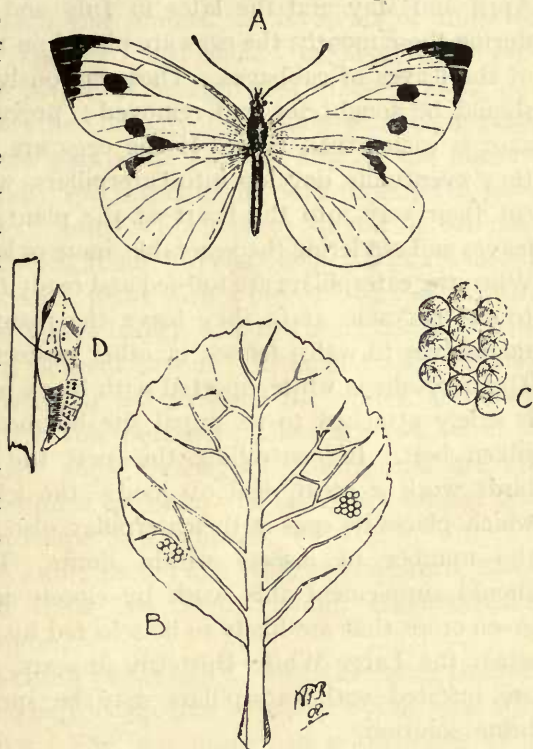


FIG. 21. CABBAGE WHITE BUTTERFLY

A.—Female. B.—Eggs deposited on a leaf. C.—Eggs magnified. D.—Chrysalis suspended by a silken band.

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distributed species of butterfly, and is familiar to every

gardener. The female insect is larger than the male, and possesses more black markings than her mate. It is double brooded. The earlier butterflies appear in April and May and the later in July and August, and during these months the eggs are placed on the under side of the leaves of cabbages. These curiously shaped eggs should be sought for and removed; prevention in this case is easier than cure. If the eggs are not removed they eventually develop into caterpillars, which steadily eat their way into the heart of the plant, riddling the leaves and rendering the vegetable, more or less, worthless. When the caterpillars are full-fed and ready for the change to the chrysalis state they leave the plant and betake themselves to walls, fences, or other protected positions. The chrysalis is white, spotted with black markings, and is safely attached to its pupal site by means of a thin silken belt. In controlling this pest the insect-eating birds work a great deal of good; the ichneumon fly, which places its eggs in the caterpillar, also helps to keep the number of insects within limits. The gardener should supplement this work by closely inspecting his green crops that are likely to be selected by the butterfly, when the Large White Butterfly appears. Plants that are infested with caterpillars may be sprayed with a brine solution.

LETTUCE, SPINACH. In addition to the members of the Cabbage family there are two other important green vegetables, viz., Lettuce and Spinach. Lettuce is an important salad, and Spinach is a valuable vegetable.

LETTUCE. Lettuce is a deservedly popular salad plant and may be easily grown on the school plots either in

rows purposely reserved or as an intercrop between Celery trenches, Beans and Peas. Sowings may be made under glass in February or out of doors from March onwards through the summer at intervals of three or four weeks. The seed bed should be thoroughly prepared and the soil must be light and friable. Plant out in showery weather directly the young plants are large enough. If the plants are left too long in the nursery bed, tall, spindly specimens result, and these often have a tendency to "bolt." Each plant should be set nine inches from its neighbour. When Cos Lettuces are nearly full grown tie each plant with a piece of bast or raffia so that the inner leaves blanch and the heart becomes crisp and acquires a pleasant flavour. In August a sowing may be made for planting out to stand the winter, and Bath Cos is useful for this purpose. There are two forms of Lettuce, "Cos" and "Cabbage;" the former are tall and the leaves must be tied; the latter are smaller and are similar in shape to a cabbage.

THE BEST VARIETIES:—Paris White, Paris Green, Black Seeded Bath Cos, Tom Thumb, Hammersmith (for winter).

PESTS AND THEIR TREATMENT. Birds are often troublesome when the Lettuce seedlings are developing, especially in dry weather. The best protection is cottoning as in the case of Peas. The slug is a far more serious enemy and lime and soot must be freely sprinkled near the rows to keep this pest from the plants. At the same time rubbish, that may harbour the slugs, should be removed.

SPINACH. Spinach is not so popular as it should be; it is easily grown and quite hardy. Sowings may be

made from February to May and again in September to stand the winter and provide a spring cutting. Spinach is a strong yielding crop provided that it is not overcrowded in the rows as is so frequently the case.

CHAPTER VIII

POD-BEARING VEGETABLES

PEAS AND BEANS



THE pod-bearing vegetables are more highly esteemed than any others of the general garden crops with the possible exception of Asparagus. This is due to the fact that they are very palatable as well as nutritious. There is a strong resemblance between these members of the Pea family or Leguminosae. The most remarkable feature of the plants is a highly-developed root system, and in consequence the correct culture of Peas and Beans demands a careful preliminary working of the soil. The nitrogen nodules of the roots are extremely interesting developments, and by means of these the pod-bearers are enabled to assimilate and store atmospheric nitrogen.

PEAS. The soil must be previously prepared by very deep digging and manuring some time before the crop is sown. Seeds may be sown out of doors from February until the end of June, and the grower who makes successive sowings over this period will be rewarded with a continuous yield of Peas provided that the climatic conditions are favourable. Early sowings can only be attempted in favoured positions, viz., on sunny borders

and in light, well-cultivated soil; on heavy, imperfectly drained land, such a course of procedure is impracticable. The principal sowing commences in the end of March, and further main crop sowings may be made until the end of May. In this way a continuous crop of early, second early, maincrop, and late Peas is obtained.

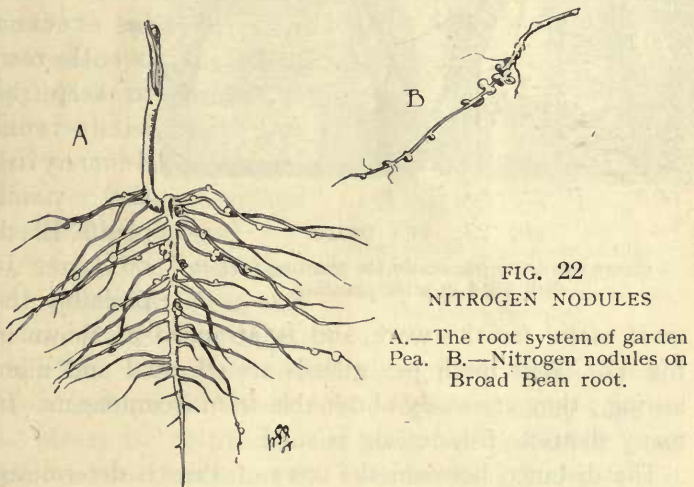


FIG. 22
NITROGEN NODULES

A.—The root system of garden Pea. B.—Nitrogen nodules on Broad Bean root.

In sowing, great care must be taken to give each seed ample feeding space. Thick sowing is wasteful and useless and should be discouraged. Often Peas are sown so thickly that the plants form a hedge of spindly weaklings that experience a difficulty in obtaining sufficient plant food. This weakness of the plant results in diminutive pods and seeds.

The drill should be about eight inches wide and four inches deep, and the seeds must be placed from two to

six inches apart in the drill. These are covered with soil to a depth of three inches, and the plants are subsequently thinned out from three inches to six inches apart.

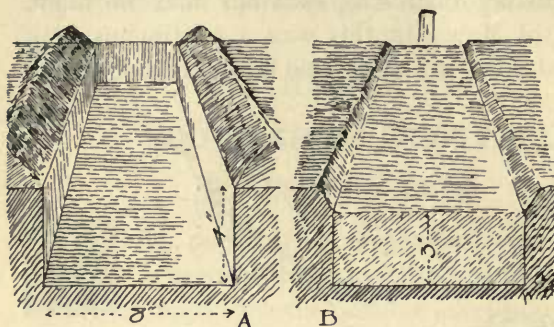


FIG. 23. PEA DRILL

A shows the drill open ready for planting ; B, the drill filled in after planting.

Soon after sowing, some form of protector must be erected over the row, to keep the birds from destroying the young plants. Black cotton is probably the most useful for this work, and is arranged as shown in Fig. 17. Wire mesh pea guards are effectual and more lasting ; they are easily obtainable from ironmongers. In many districts fish-netting is used.

The distance between the rows of Peas is determined by the height of the plant. Thus two feet peas are planted two feet apart ; five feet peas are planted five feet apart, and so on. The rows should run slightly north-east and south-west so that the sun can warm and nourish the plants. In the school garden the two feet or two and a half feet peas are the best to grow on account of the necessarily mixed nature of the crops. The question of the soil is also of importance in selecting the seed, dwarf peas will do best on light dry soils, and tall peas are best suited for heavy land.

In staking Peas place the sticks so that the development of the plants may progress unhindered. Often the sticks are inclined inwards so that they meet at the top; this system should not be followed, for it crowds the tops of the plants and they do not receive sufficient air and sunlight. The sticks should be vertically in the rows so that light and air have free access. Hazel or Chestnut stakes are the best for use.



FIG. 24. STAKING PEAS

The outwardly sloping sticks allow the plants ample room for growth; when the stakes slope inwardly the Peas are crowded.

PESTS. The most common pests that beset the young plants are birds and slugs, and these injure the crop by removing the leaves and growth shoots. The birds are easily kept off the plants by cottoning, and slugs are prevented from their nocturnal raids on the Peas by the aid of soot and lime. A fine tilth around the growing plants also aids in keeping down the pests, for there is scanty harbourage for them.

PEA AND BEAN WEEVIL (*Sitones lineatus*). This pest is very different from those already referred to and is not easily dealt with. Often the ravages of the Pea and Bean Weevil are ascribed to birds, or perhaps slugs, and strange to say whole rows of Peas are often destroyed and the cause never really known. This, of course, indicates a weakness in the grower's observational powers,

for the insect that causes the damage is easily discovered.

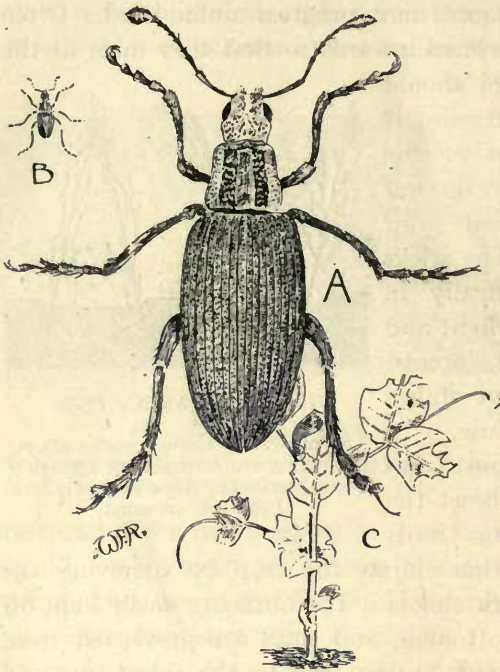


FIG. 25. THE PEA AND BEAN WEEVIL

A.—Enlarged drawing of the beetle showing its scaly appearance, hooked feet, and bristly legs. The Weevil is grayish above and light coloured below so that, when it falls on its back, as it frequently does, it is invisible. B.—Weevil natural size, viz., about $\frac{1}{4}$ of an inch in length. C.—A Pea plant that has been attacked slightly by the Weevil. When the attack is severe the ribs alone of the foliage are left.

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It is a grayish-brown beetle about one-fifth of an inch long; its back is striped, and its underside is of a grayish-clay colour, so that when the Weevil falls off the plant when disturbed and turns on its back in its characteristic fashion, it is for a moment invisible. In time, the weevil places its eggs on the stem of the pea or bean that is below the soil, and soon afterwards a new generation of beetles appears to carry on the

work of destruction. Lime or soot may be used as a

remedy against this pest, and it should be sprinkled over the plants after rain, or early in the morning when the plants are moist with dew.

THE BEST VARIETIES OF PEAS :—

Early.—English Wonder, Early Giant.

Maincrop.—Prince of Wales, Sharpe's Queen.

Late.—Autocrat, Gladstone.

BROAD BEANS. These are the hardiest of the pod-bearing vegetables, and will easily stand through the winter months. Thus they may be sown in November, with the result that an early crop is secured in the following summer. Generally the first sowings are made in February. A drill is drawn twelve inches wide and about four inches deep, and the seeds are set four inches apart down each side, placing them in such positions that those in the one row are not opposite those in the other. The drills are then filled in, and on light soils it is necessary to firm the ground above as well as below them. When the plants are about three feet high—earlier should they become infested with Black Fly—the tops should be pinched out so that further growth is retarded and the development of the pods may proceed rapidly.

PESTS. The Broad Bean is very susceptible to the "blight," which is simply another name for the "Bean aphis" or Black Fly. Aphides are troublesome pests and multiply very quickly, yet they are easily removed by frequent spraying with a soft soap solution. This emulsive wash blocks up the breathing apertures of the aphis, or plant lice, and thus destroys the pests. The aphides spread very quickly from plant to plant, and thus crowded sowings aid the distribution of the pest. In hot, dry

weather, the aphides flourish and the plants are least able to withstand their ravages, and the pests, unhindered, suck the plant juices, and finally, if they are not checked, they invade the pods, and complete the destruction of the Broad Bean crop.

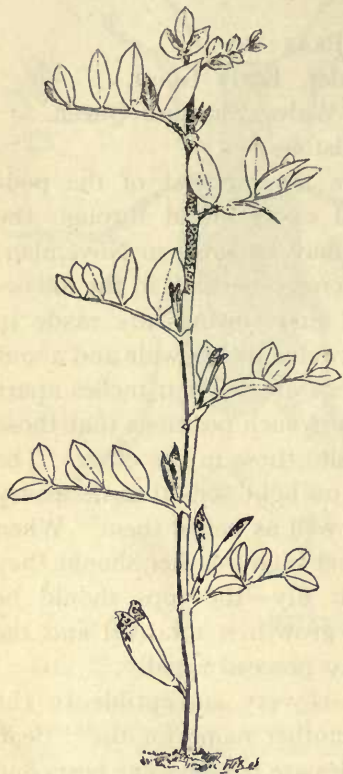


FIG. 26. BEAN BLIGHT
(*Aphis rumicis*)

THE BEST VARIETIES OF BROAD BEANS:—Exhibition Long-pod, Improved Broad Windsor.

DWARF FRENCH BEANS.

Dwarf French, or Kidney Beans, are favourite additions to the garden, but they demand careful culture if fresh and tender produce is to be obtained. The soil on which the beans are to be planted must be thoroughly prepared and deeply dug. The second point for careful consideration is the sowing. Many growers crowd their plants, with the natural result, that

they are weak and can only produce undersized pods. Not only is there a loss in size, but also in flavour. Kidney Beans are sown in April at a distance of one foot apart ; many authorities quote six inches and nine inches,

but there is no gain in such procedure. The only result can be stringy pods.

THE BEST VARIETIES:—
Canadian Wonder
Ne Plus Ultra.

RUNNER BEANS. Scarlet Runners are favourites in most gardens. They are sown in May at distances of nine inches to a foot apart, and at a depth of three inches. They may be grown in the seed plot and transplanted to the rows. As soon as the twining stem of the bean develops, tall stakes must be provided; these stakes may be arranged in many ways, but probably the arrangements shown in Fig. 29



FIG. 27. CROWDED DWARF BEANS



FIG. 28. A WELL DEVELOPED DWARF BEAN
(Contrast with preceding illustration)

are the most useful for the school plot. On small plots there is no room for climbing beans. It is, however,

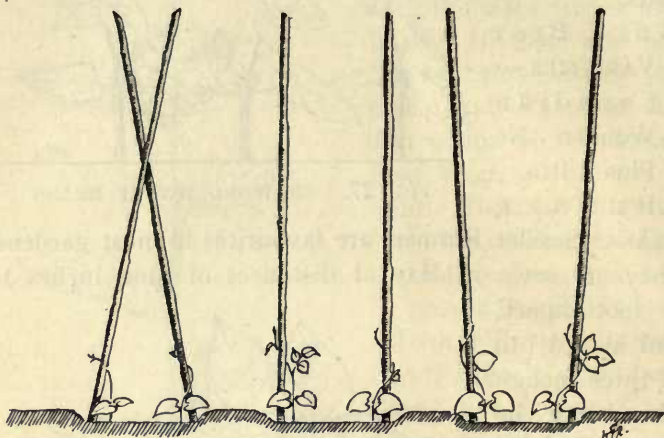


FIG. 29. THREE METHODS OF STAKING BEANS

possible to cut away the growing shoots and thus obtain a crop from dwarf plants.

THE BEST VARIETIES:—Champion, Ne Plus Ultra, Best of All.

CHAPTER IX

TAP-ROOTED VEGETABLES

BEET, CARROTS, PARSNIPS, TURNIPS, RADISHES

THESE vegetables are generally referred to as the "root" crops, and the term, to a certain extent, is a correct one. In the case of Beet, Carrots, and Parsnips, the tap-root is enlarged into a food storage. Turnips are rarely included in this group;

sometimes they are referred to as bulbous roots, yet their true position is among the Cabbage family, viz., Cruciferae. For matters of convenience and cultural procedure, I include Turnips among the tap-rooted vegetables.

In general, the tap-roots demand a deep tillage, and constant attention during the period of growth. The nature of the tap-root is such that free growth is essential to the formation of symmetrical and good-flavoured roots. This is only secured by thorough digging previous to sowing. It is useless to move the top three or six inches of soil and expect excellent roots. If the soil were manured for the preceding crop, no fresh manure will be necessary or desirable, but if it is very poor, refuse material may be worked into the second spit. In all cases the manuring operations should have been completed some time prior to the actual sowing, so that the food substances may become evenly distributed in the soil. It is the aim of every grower to produce well-shaped roots, and symmetrical form can only be secured by attending to the points referred to. In many cases badly-shaped roots result from thick sowing and belated thinning, as well as injudicious manuring. These operations will be referred to under each heading.

BEEF. Soil which has been freshly manured is not suited to this vegetable, and an endeavour must be made to sow the seeds in a fine soil that has been thoroughly cultivated during the previous season. Coarse soil and fresh manure induce coarseness, fanging, and forking. Sowings should be carried out late in April and in May; drills two inches in depth and a foot apart should be drawn

and in these the seed should be dropped in clusters of three or four at intervals of nine inches. Subsequently the seedlings should be thinned out to single plants, selecting the weaker ones for retention and the stronger for removal, since these latter often develop into coarse plants.

The seed beds must be protected from the ravages of the birds, who delight to pull out the seedlings for the sake of the succulent seed leaves. It is interesting to note that the green-leaved Beet are not so frequently attacked as those having coloured foliage. The soil between the rows and the plants must be thoroughly and continually hoed. The value of a fine tilth around growing root crops is often underrated; in the first place it conserves moisture, in the second place it allows growth to proceed unhindered, and in the third place weeds are removed before they are large enough to enter into serious competition with the crop.

In October the roots should be lifted; this operation calls for great care, for if the skin is broken or bruised the root loses a great amount of those sugary juices

that give the plant its colour and flavour. This is known as "bleeding." The fork should be inserted in the ground near the root and

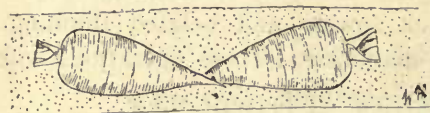


FIG. 30. ROOT STORAGE

The roots are arranged as shown and completely surrounded with sand.

driven well below it; gently press the handle of the fork downwards and remove the plant. On account of the removal of soil in lifting the first root in the row,

it is easier to lift the remaining roots. After lifting remove the leaves by twisting off the leaf stems at least three inches above the crown; arrange the roots neatly in a pit dug in the garden and lined with sand, or in layers alternated with sand in a cellar or outhouse. The roots are withdrawn from the store as they are required for use. If they remain in the ground till the arrival of the frosts the roots will be destroyed.

THE BEST VARIETIES:—Dell's Crimson, Cheltenham Green-top.

CARROTS. Carrots demand, as in the case of Beet, a thoroughly worked soil, and it is not sufficient to perform this operation just before sowing. The ground should be selected for the carrot bed in autumn or early winter and be well dug and manured with refuse if necessary. If manure is applied to the soil in spring, the Carrots will grow fangy and misshapen. A deep soil will ensure that

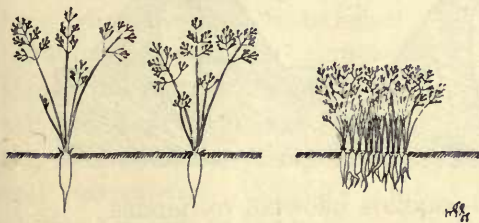


FIG. 31. THE VALUE OF THINNING

On the left are two Carrots which have grown excellently since they have had ample space; on the right the Carrots could not develop owing to packing in the row.

the roots have sufficient room for downward growth.

Carrots may be sown from March to July, the seeds being dropped in clusters of three or four at intervals

of six to twelve inches according to the variety; the drills must be one inch deep, and twelve inches asunder. Subsequently the seedlings should be thinned out to

single plants. This thinning is of the greatest importance; if it is neglected, small, ill-shapen roots will be the result. If small Carrots are required for soups and flavouring purposes, the sowing should be continuous in the drill and the thinning should proceed in two stages, viz., at the first thinning the plants may be left three inches apart and every other one is subsequently pulled for culinary purposes. However, there is no gain in thick sowing or crowded growing.

The roots are pulled in autumn, the leaves should be removed and the crop stored similarly to Beet.

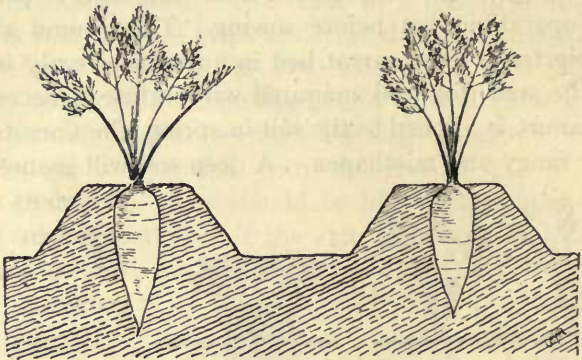


FIG. 32. CARROTS GROWING ON RIDGES

THE BEST VARIETIES :—The selection of Carrots depends on the character of the soil. For light deep soils, New Red Intermediate is recommended, and for heavy soils Market Favourite and Model are good.

PESTS. The Carrot crop is often attacked by Wireworm and the Carrot Fly. The Wireworm is described in Chapter X.

THE CARROT FLY. The presence of this pest is indicated in its early stage of development by the colour of the leaves changing. If such an infested Carrot be pulled, the maggots of the fly may be seen in the root. If the pest has become established the crop is rendered worthless, while slight attacks produce "rusting" of the roots. The fly itself which produces the trouble may be found in spring; it is a small two-winged insect about one-fifth of an inch in length. In May it proceeds to place its eggs on the carrot just below the soil surface, and when the maggots hatch they work downwards into the tender root. The ravages of this pest may be lessened by previously dressing the soil with gaslime when the land is trenched. Sprayings of paraffin emulsion should be carried on, and if the soil be kept firm well up to the crowns of the plants the fly will experience difficulty in placing her eggs on the root.

PARSNIPS. This hardy root crop flourishes in a sound loam, and previous to sowing the soil should be most thoroughly cultivated; no fresh manure must be used. As in the case of the Carrot bed the preliminary operations should be carried out in late autumn or early winter. It must be remembered that this crop in particular

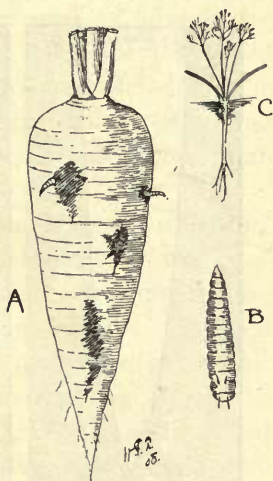


FIG. 33. CARROT FLY
(*Psila rosae*)

A.—Infested Carrot. B.—Enlarged drawing of maggot. C.—Eggs on young plant.

requires a great amount of root space, and every effort should be made to provide it. Extra large roots may be grown by boring large holes and filling them with friable

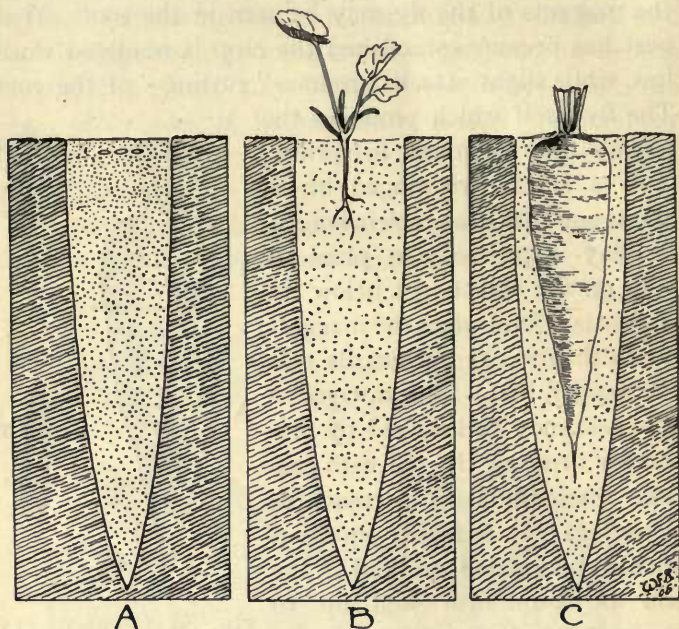


FIG. 34. HOW TO GROW EXHIBITION CARROTS, BEET, AND PARSNIPS

A.—Hole made with crowbar and filled with compost; three seeds are sown as indicated. B.—The strongest seedling is retained and the others rejected. C.—Root filling the prepared form.

compost. Two or three seeds are sown in such a station and the strongest plant is selected for future growth. Thus the shape of the root is determined by the hole previously made. This practice is of especial value in the case of heavy or strong soils, or where exhibition

produce is being grown. In general culture, however, this practice is not necessary, and if the soil is moved previously to sowing to a depth of at least two feet, a successful crop should be the result.

Sowings may be commenced in February if the weather permits. Make drills one inch deep and fifteen inches apart, and in these drills sow the seed as advised for Beet. Subsequently the strongest plants are retained at twelve inches apart when the rows are thinned. By no means allow thick sowings. Parsnips can be lifted and stored similarly to Beet, but they are best drawn from the soil as required for use.

THE BEST VARIETIES:—For general garden culture grow Tender and True and Hollow Crown.

PEST. PARSNIP CANKER. This is a fungoid disease that works extensive damage among Parsnips. Infested soils should be dressed with gas-lime at the rate of two lbs. per square yard in autumn. The dressing should be thoroughly worked into the top layer of the soil, so that it may be brought as much as possible into contact with the spores.

CELERY FLY. The Celery Fly may attack Parsnips, and the same procedure should be followed as recommended in Chapter XII.

TURNIPS. This crop may be sown from March to July. It prefers a shaded station, and on account of this fact, it may be grown between Peas and Beans. Drills are drawn one inch deep and one foot apart, and in these the seed is thinly distributed. The seedlings are thinned out to nine inches apart. The surrounding surface soil must be kept fine and loose so that moisture is retained ;

if the crop matures in hot weather the roots become coarse, lose flavour and are generally useless for the table. Another sowing may be made at the end of the summer or at the beginning of autumn. Turnip greens, or tops, are good for food, and are obtained by allowing the roots to stay in the ground.

THE BEST VARIETIES:—Model (for summer), Red Globe (for winter).

PESTS. The turnip belongs to the cabbage family, and in common with the other members of that family it is often attacked by the Club Root fungus. The roots are distorted into curious shapes which have given rise to the name of "Finger and Toe." It should be treated in exactly the same way as recommended for the green vegetables in Chapter VII.

THE TURNIP FLEA BEETLE. The Turnip Fly, or Flea Beetle, causes a great amount of damage to young plants. The riddled seed leaves and foliage leaves indicate the presence of the pest, and a careful examination of the bed will undoubtedly reveal the beetle itself. It is about one-tenth of an inch in length, dark in colour and marked on each wing case with a yellowish stripe. Its strong legs enable it to take long leaps, and its well-developed wings carry it long distances. As soon as the Turnip seedlings push through, the beetles appear, and at once commence to feed on the seed leaves. It then places its eggs on the foliage, or "rough" leaves; from these eggs emerge the larvæ which mine their way into the leaves and feed on the plant juices. These attacks on the young plant naturally rob it of its vigour. When the larvæ are full-fed, they drop to the ground and

change to the pupa form ; in about three weeks from the time of laying the eggs another generation of beetles

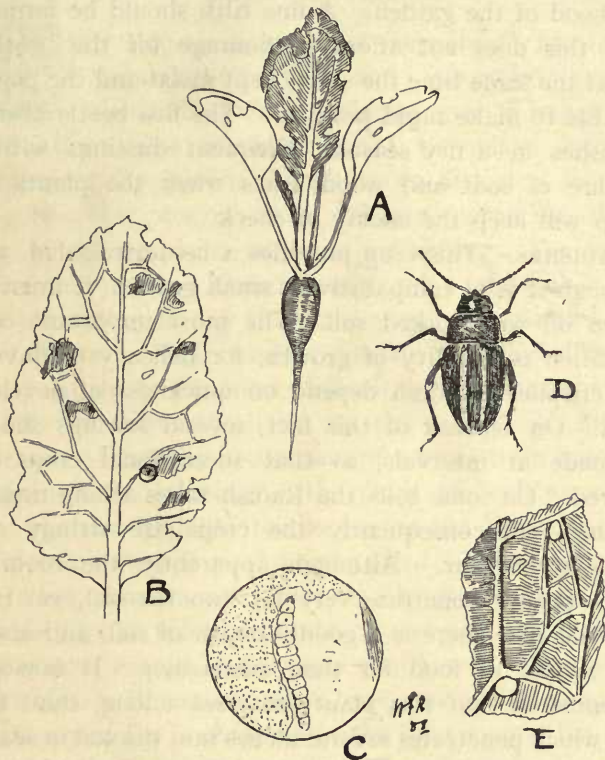


FIG. 35. TURNIP FLEA BEETLE (*Haltica nemorum*)

A.—Young Radish plant attacked by beetle. B.—A rough leaf of Radish showing the maggots boring into the leaf tissue. C.—Enlarged view of a maggot at work in the leaf. D.—The beetle. E.—Enlarged drawing of a portion of a rough leaf showing eggs.

appears to carry on the same scheme of operations. The beetles are able to spend the winter under stones, clods,

or in refuse. Hence the first preparation on the part of the gardener is to clear away all rubbish from the neighbourhood of the garden. A fine tilth should be formed, since this does not afford harbourage for the beetles, and at the same time the soil is kept moist and the plants are able to make rapid progress. The flea beetle always flourishes in a dry season. Frequent dustings with a mixture of soot and wood ashes when the plants are damp will keep the enemy in check.

RADISHES. This crop provides a favourite salad, and although it is of comparatively small growth, it must be grown on well-worked soil. The most important consideration is rapidity of growth, for delicacy of flavour and crispness of flesh depend on quickness of development. On account of this fact, several sowings should be made at intervals, so that successional crops are secured. On some soils the Radish takes a long time to mature, and consequently the crops are stringy and coarse in flavour. Although apparently the roots or bulbs, do not penetrate very far into the soil, yet it is essential that there is a goodly depth of soil, and also a rich supply of food for their sustenance. It must be remembered that this plant possesses a long, thin, tap-root which penetrates several inches into the soil in search of the food that is eventually stored in the bulb. In the school plot this crop may be sown broadcast along the borders.

CHAPTER X

THE POTATO



THE Potato is the most important crop of the vegetable garden, and successful growing demands careful culture and thorough soil cultivation. The introduction of the plant into the gardens of England is a well-known historical fact, yet its subsequent progress as an article of diet in the estimation of the people is far more interesting. For several years raisers have experimented upon the tuber with the result that to-day there are numerous varieties upon the market. This cross-fertilisation and hybridisation has been made the more difficult by the fact that the Potato is extremely liable to the attacks of fungoid diseases. Thus the production of a new strain has often weakened the stamina of the plant to such an extent that the susceptibility to the disease has been increased. At present there is no "disease proof" Potato, although there are many varieties that may be grown more or less successfully in spite of potato disease and leaf curl.

Potatoes require a deep and friable soil, which should have been well manured some time previously to planting. Such a medium is obtained in the light loams that often occur in the thoroughly well-cultivated soils in the chalk or limestone districts. In addition to these requisites the Potato in common with the Tomato, its cousin, demands drainage, and little success can result from growing Potatoes in low-lying and imperfectly drained soils. In general the ground should be prepared in autumn, and the manuring must be performed so that the sets,

when planted, do not come into direct contact with the manure. To prevent this, place the manure a foot below the surface.

In propagating the potato, "sets" are employed, and their preparation for planting requires much care and attention. In fact, the selection of the "set" is of

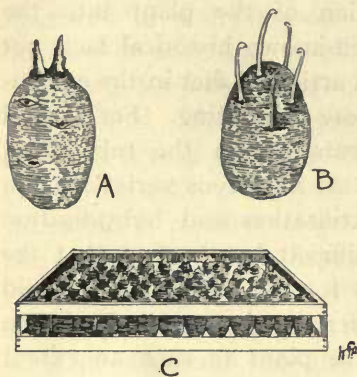


FIG. 36. SEED POTATOES

A.—A good set. B.—A weakling.
C.—A potato box for sprouting seed.

paramount importance. If the grower intends planting seed selected from his previous year's crop, he must carefully examine the tubers soon after they are lifted in autumn. The selected "sets" should then be stored under conditions that will favour early development. These conditions are secured by placing them in a well lighted shed which is frost-proof. These stored

sets, are placed in shallow boxes or trays, in January, and kept in a dry and perfectly ventilated situation. Shoots soon appear, and one or two of the strongest of these are allowed to develop; the weaker sprouts are rubbed off. In this way sets with strong growths are prepared for planting. For purposes of planting, whole sets weighing about three ounces are the most suitable. In the case of larger sets, it is necessary to cut them into sections so that each division contains a strong eye. These sliced sets should weigh about three

ounces, and, before proceeding to plant, it is a good practice to dip the cut surface in lime as a safeguard against the development of fungoid diseases.



FIG. 37

HOW TO DIVIDE
A LARGE SET

PLANTING. Potato planting may be done from the middle of March to the end of May. In sheltered positions or on borders facing south, planting may be performed late in February. Naturally, the time of planting depends greatly on the character of the soil and the aspect of the garden.

There are several methods of planting, but undoubtedly the best is that of drilling.

It certainly demands more time, yet by means of the extra pains and time, the crop is planted more evenly and thoroughly than by other systems. Drills from four to six inches in depth are made, and in these the sets are placed about a foot to eighteen inches apart. The drills should be two feet to three feet asunder according to the height of the haulm. Tall growing varieties must be placed three feet apart.

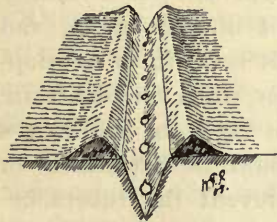


FIG. 38. PLANTING
POTATOES IN DRILLS

The dibber is often used in planting; in this case a hole is made and a Potato is dropped in. Quickness is the only argument in favour of this method, and often the shoots of the sets are broken when the Potato is dropped into the hole. Also by this method the tubers

are planted at varying depths with the result that the plants are uneven when the leaves appear.

The depth of planting depends on the nature of the soil, the time of planting, and the forwardness of the set. In light soils the sets may be planted eight inches down; on heavy soils four inches is sufficient. The distance between plant and plant and row and row is determined, as already mentioned, by the height of the Potato to be grown. Short-topped Potatoes can be planted twelve inches apart with a distance of one foot nine inches between the rows. Tall growing varieties require eighteen inches and three feet between the rows.

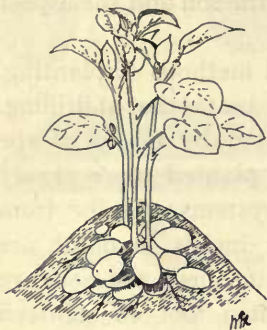


FIG. 39. EARTHING UP POTATOES

The tubers are borne on underground stems which are distinct from the roots. Earthing up aids the development of the potatoes near the surface and also prevents "greening" of the tubers.

When the plants are six inches high they must be earthed up, and previous to this operation a dressing of nitrate of soda should be given. This ensures a healthy development of the haulm, and consequently helps tuber development. Later, when the plants are about a foot high, the final earthing up should be performed in order to prevent the tubers becoming green through exposure to light.

When the Potatoes are ready for lifting the haulm turns yellow and withers; this should be removed and burned, especially if the crop has shown any evidence of the presence of fungus. The tubers must be carefully

lifted and stored in a dry place. For this purpose a pit is dug and lined with straw or dried fern; the tubers are put in, the pit is covered with soil so that it is frost-proof, and a small opening filled with straw is left for the escape of moisture. Such an arrangement is known as a potato pit or clamp.

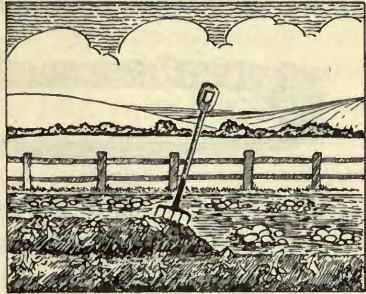


FIG. 40. LIFTING POTATOES

The selection of varieties for planting requires careful consideration. The

nature of the soil is of the greatest importance, and often in the case of signal failure of a crop a change of seed will do good. Generally, for early crops, Duke of York may be recommended; for main crop, British Queen, and for late use and storage, Factor.

DISEASES AND THEIR REMEDIES. The diseases that attack the Potato are mainly fungoid in character, yet much damage can be wrought in the Potato plot by the Wireworm. However, the treatment of insect pests is a very different matter from the eradication of fungoid diseases, and very little, if anything, can be done when the fungus is well established in the Potato plant. Prevention is better than cure, but here "prevention is the only cure."

POTATO DISEASE. This dreaded disease is caused by a fungus which develops in early summer. The disease may arise from infected sets or from resting spores in the soil. The first indication of its presence is the

appearance of dirty white patches on the under sides of the leaves ; these patches turn brown and the leaf curls. Spores are produced and aided by wind and rain, they

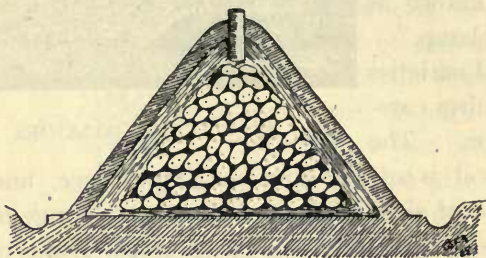


FIG. 41. POTATO STORING

The upper figure represents a pit ; this may be about four feet in depth and width, and there must be ventilators formed of long sound straw at intervals of six feet along the top for the escape of moisture. The lower figure shows a potato clamp in section with the Potatoes and ventilator in position.

are easily taken into the soil, and they also travel in the air to other plants in the neighbourhood. Thus one diseased plant may infect a whole district. Warm, damp weather provides the ideal conditions for the development of the spores. Some of the spores pass into the soil and attack

the tuber, and thus the destruction of the Potato crop is completed.

When the disease makes its appearance cure is beyond hope, and the only thing that remains to be done is the burning of the crop—tubers and haulm. The next step is the dressing of the soil, and Potatoes should not be grown on the plot the following season. Gas-lime should be spread over the plot, and after three weeks

the dressing must be worked evenly into the soil. Attention to the selection of seed is also helpful, and when the crop is growing the earthing up operation must be carefully carried out so that the spores cannot easily reach the tubers. Finally the haulm must be sprayed with Bordeaux mixture early in July, *before* the appearance of the disease, and again or even three times, according to the weather, at intervals of fourteen to twenty-one days. Late spraying is useless and a waste of mixture and time.

LEAF CURL. This is another fungoid disease that often makes its appearance among the Potatoes. It arises from the set, and its presence is indicated by the curling and discolouring of the leaf. The set remains quite hard, the tuber development is arrested. It is prevented by careful selection of seed. Spraying with Bordeaux mixture early in July should also be resorted to.

POTATO SCAB. This fungus attacks the skin of the tuber, yet its effects are not destructive so far as the eating value of the Potato is concerned. However, a scabbed Potato has an altogether unhealthy appearance, and few growers care to note its appearance among their produce. Scabbed seed will produce a scabbed crop, therefore discard all sets showing any signs of scab. Sometimes the spores of potato scab are present in the soil, and under such conditions potato drills should be dressed with powdered sulphur, or, as it is known commercially, Flowers of Sulphur.

WIREWORM. This pest terminates the long list of troubles to which the tuber is heir. Remedy here is more certain, and in a short time the gardener can rid the soil of a large number of these grubs. The Wireworm

is a light yellow, hard-skinned larva, which after three to five years passes into a pupa that eventually produces a beetle known as the Skip Jack or Click beetle. The damage wrought by the larva is extensive, and few roots

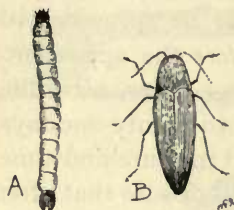


FIG. 42. WIREWORM
A.—The Wireworm. B.—The Click beetle of which the Wireworm is the larval form.

that grow in field or garden come amiss to this voracious feeder. When Potatoes are placed in a "wireworm" soil the results are disastrous, and very little can be done at the time in the way of remedy. The best procedure is thorough cultivation and the rigorous slaughter of every larva that presents itself. Rough digging will throw the soil open to the birds, many of which

are fond of a wireworm diet. A dressing of gas-lime will also help to clear the infested soil of these undesirable pests.

CHAPTER XI

BULBOUS-ROOTED VEGETABLES

ONIONS, LEEKS, SHALLOTS

THE members of this group of vegetables flourish in richly manured and deep soil. With attention to these details the bulbous-rooted crops are easily grown.

THE ONION. It is not always recognised that Onions demand a deep soil, yet success in raising this crop is not possible if such conditions are not provided. For this reason it is a good practice to grow Onions on the

site of last year's Celery trench, or, if this is not possible, bastard-trench the onion plot and work decayed manure into the soil to a distance of a foot. This preliminary preparation is of the greatest importance, but in very many instances the seed is sown in soil that has not been perfectly cultivated. The seeds may be sown direct in the beds, or raised earlier in boxes placed on a gentle hot-bed. Ordinary sowings, viz., outdoor sowings, are made in March and April for autumn and winter Onions, or in August for spring and early summer produce. The drills should be one inch deep, and the rows nine inches to a foot apart. If the seeds are sown in boxes the seedlings are pricked off three inches apart and subsequently planted out one foot asunder in April. The soil of the seed-bed must be made very firm. This favours rapid development of the bulbs.

For crops such as those required in the school garden, it is best to sow direct in the soil. Very thin sowings are made, and the young plants are thinned out to four inches apart. If the rows are at least nine inches asunder the hoe can be kept at work during development.

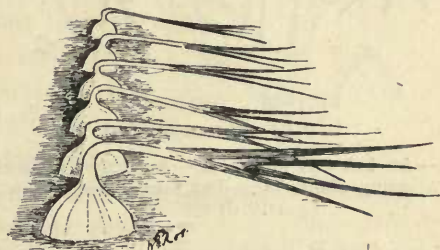


FIG. 43. RIPENING ONIONS

The tops are bent over as shown, and in this way the ripening of the bulbs is hastened.

When the bulbs are approaching maturity the tops are bent over from the neck. This is known as "finishing" Onions, and it

secures full sunlight and warmth for the ripening bulbs. Eventually the bulbs are lifted and stored in "ropes" or in thin layers in a damp-proof place.

THE BEST VARIETIES :—Bedfordshire Champion, Ailsa Craig, Lemon Rocca (for winter).

PEST. The Onion Fly. This pest is a very serious

one, and on many soils makes it almost impossible to grow satisfactory crops. However, by means of soil dressings it is overcome eventually. Its presence is quite unmistakable, for the tips of the tubular leaves turn yellow and finally the plant withers. Examination of the bulb brings to view a number of small white grubs, and these are the

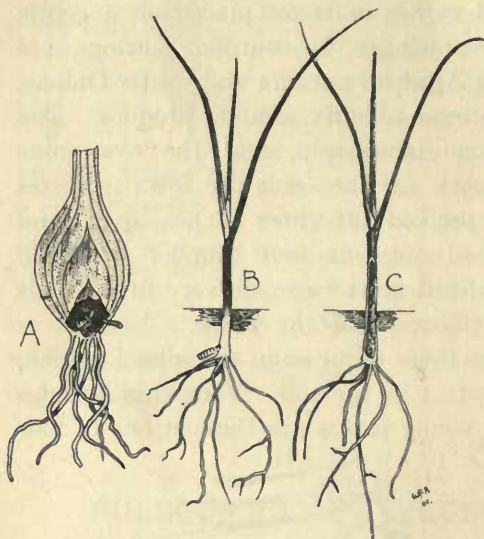


FIG. 44. ONION FLY
(*Anthomyia ceparum*)

A.—An infested bulb. B.—A maggot entering a young plant. C.—The same plant shown partly in section.

larvæ of the Onion Fly. The fly itself is on the wing at the end of April and during May; it lays its eggs on the neck of the Onion or at the base of the leaves; the grubs emerge from the eggs in about a week and commence their destructive wanderings through the bulb.

They pass from plant to plant and finally take up their pupal quarters in the soil.

In order to remove the pest, the Onion bed must be dressed with lime, and every infested plant must be burned. Then, when the plants are developing, paraffin emulsion should be sprayed over the rows. These sprayings must be repeated from time to time. The soil should be brought up to the necks of the plants so that

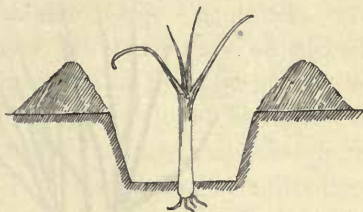


FIG. 45. LEEK PLANTING

The young plants are placed in trenches four to six inches in depth according to the nature of the soil.

the egg-laying process is rendered difficult. On light soils the pest is much more serious since the conditions are very favourable to the development of the insect.

LEEKs. Leeks are hardy and easily grown vegetables. In common with Onions they require a deep, rich soil. The seed is sown in March in the seed bed and in May, or early June, the plants are placed out in the rows. The plants should be a foot apart and the rows two feet asunder. The best method is to place Leeks in a trench so that the earth can be brought up to them in order to produce white stems. In this state they will stand the winter.

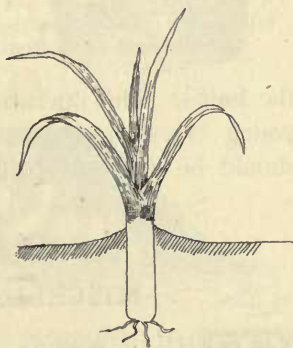


FIG. 46
EARTHING UP LEEKS

THE BEST VARIETY:—Musselburgh.

SHALLOTS. This bulbous plant should find a place on every plot on account of its popularity for pickling.

It is easily grown, yet it requires a certain amount of cultural care.

Shallots may be planted in February or March and should be placed in the soil nine inches apart so that only the neck remains above ground. It is necessary to plant them firmly, and, as the growth proceeds, the soil should be gradually drawn from the

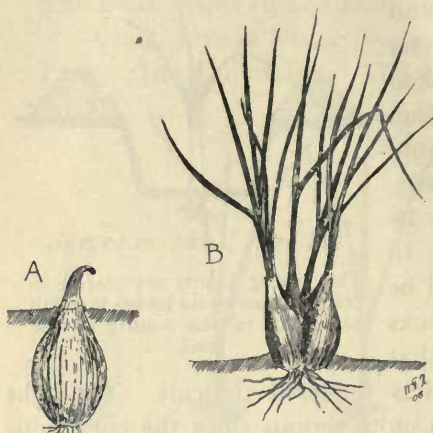


FIG. 47. SHALLOTS

A.—A bulb planted. B.—A clove nearly fully grown showing how the soil is gradually brought away from the bulb.

the bulbs. This operation aids the development of the young cloves and also keeps them clean. The crops should be lifted in July.

CHAPTER XII

MISCELLANEOUS CROPS

THE preceding chapters deal with the main groups of vegetables that are suitable for school garden plots, yet there are others which may be introduced either to the plot or the nursery bed. For

instance, it is obviously impracticable to grow Vegetable Marrows on the individual plot, although the culture of this estimable vegetable may be easily demonstrated on the nursery plot. Thus also Ridge Cucumbers may be grown. On one rod plots, Rhubarb may be placed, but it is quite out of the question in the case of smaller plots. In such circumstances space should be made for a few stools on the nursery bed, or failing that—elsewhere. On the same lines a row of Artichokes may be cultivated. The culture of Tomatoes may also be attempted in the school garden; one plant can be placed on each plot, or, if local conditions are more favourable, a row of plants may be established beside a warm wall or fence.

VEGETABLE MARROW. This vegetable requires ample

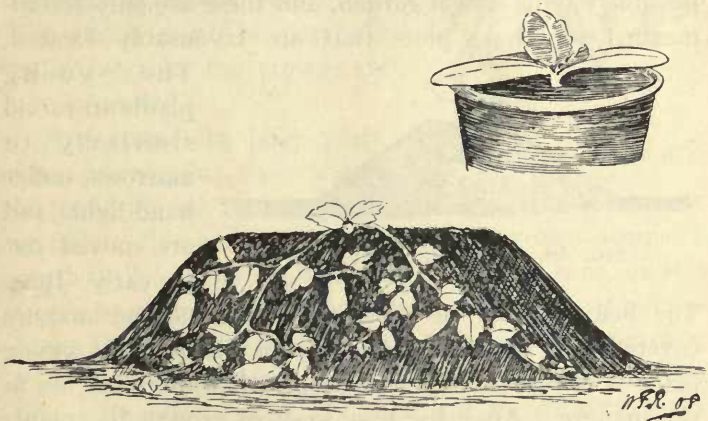


FIG. 48. VEGETABLE MARROWS

space, more than the ordinary school plot can well afford; therefore it should be placed in some corner where a full exposure to the sun is secured. A manure heap is the

ideal position, and failing this a suitable station should be selected, and a hole dug to a depth of a foot or a little more. This should be filled with well-rotted manure and covered with light soil. For school gardening purposes the seeds may be placed in the soil in June, or if a hand-light is accessible the sowing may be done in April. When the plant develops the main shoot should be pinched off so that the lateral shoots are stimulated into growth; furthermore, this ensures more rapid development of the fruits, and these should be cut when young and tender. Care must be taken that the runners do not grow over one another. One plant of the Bush Marrow may be accommodated on each plot.

CUCUMBERS. Of course, Ridge Cucumbers alone are possible for the school garden, and these are only recommended for those plots that are favourably located.



FIG. 49. A RIDGE CUCUMBER

The young plants are raised similarly to marrows, under hand-lights, and are moved out in early June.

The bed is made of a ridge of well-decayed manure covered with fine soil, and in the middle of this a young plant is bedded, but not so deeply that the roots are in the manure. After the first week of growth the plants require no special shelter. If a frame is at hand—and by the way, complete garden work cannot be attempted without one—the plants may be hardened off ready for planting.

RHUBARB. The space demanded by this plant, combined with its exhaustive results on the soil, makes it almost impossible to bring the vegetable into the individual plot. However, on large plots it is possible to cultivate small stools. Planting may proceed in September or October, and also in March. Dress the surrounding soil with rich manure, and when the crowns are ready to burst they should be covered with straw, litter, or some other suitable covering to foster rapid growth. The large stools should be divided in spring and the strongest crowns replanted. The stalks must be carefully pulled so that the crowns are not injured.



FIG. 50

A RHUBARB CROWN READY
FOR PLANTING

TOMATOES. In large plots, viz., one rod plots, space should be found for one Tomato plant, or failing this a row of plants may be grown against a south wall or fence. Obtain the plants in June, or if a frame is available, raise them from seed sown in pots or boxes in March in gentle heat. Prick off into boxes so that the young plants do not touch one another, and finally transfer to pots. In June, put the plants in good, well-drained soil. Drainage for the roots is of great importance, and for this reason the station may be placed on a slope; too much moisture favours an excess of leaf growth.

The side growths must be pinched out so that the energy of the plant is thrown into the main stem. The practice of removing the leaves must be conducted with great care, with due attention to the reason that necessitates the operation, viz., exposure of the ripening

tomatoes to sunshine.

It must not be forgotten that leaves carry on an important function in obtaining food, and when they are completely removed, the plant is naturally destitute. The leaves should never be removed until the fruits are set. The ripe fruits must be removed, and those that remain unripened late in the season, should be gathered and packed carefully in soft tissue paper in boxes.



FIG. 51. TOMATOES

Axillary growth are pinched out as shown in smaller figure.

MUSTARD AND CRESS.

These two important salad plants are very easily and also quickly raised. Cress takes a day or two longer to mature, and hence should be sown before the Mustard. These plants may be raised in boxes, or introduced in the garden plot. They may be quite easily grown along the paths without interfering with the long-standing crops.

The soil must be carefully forked and made quite fine by means of the rake. The seeds may be scattered evenly on the soil and gently patted down by means of a spade. The soil should then be watered.

PARSLEY. A border of Parsley along the central path gives the school plots a neat appearance. It is necessary that the sowings should be thinly made, and that the mature plants should be carefully picked over, so that old leaves do not remain. Crowded borders are frequently seen, and dwindled plants of poor quality result. This may appear a mere detail, yet in the economy of the garden, it is an important point. This cultural treatment bears out the teaching of these pages, viz., that each plant shall have ample room for development. There must be in the first case well manured soil, and depth for root growth, and finally there must be leaf room. This can only be secured by careful culture, yet many gardeners fail to recognise this fact. It does not matter what the crops may be, if these principles are observed, viz., rich soil, root depth, and leaf room, then the grower of vegetables is on the road that will finally lead him to success.

CELERY. Celery is a useful and health-giving salad, and wherever possible it should be included in the cropping of the school plots. However, it is out of the question if the plots are small and must only be grown on rod plots, or, of course, those of larger area.

The seeds are sown in gentle heat in February, and the seedlings placed three inches apart in boxes. These are hardened off and in June and onwards they will be ready for the trenches. The soil upon which Celery is

to be grown must be thoroughly prepared in the previous autumn. The trench should be from eight inches to a foot in depth, according to the soil, and it may be one foot in width ; deep planting is desirable. The base of the trench must be thoroughly broken up with the fork, and some well-decayed manure should be worked into

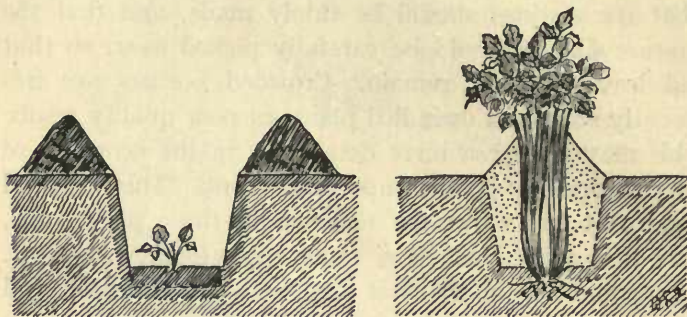


FIG. 52. CELERY TRENCH

the soil. A little top soil should be sprinkled into the bottom of the trench in order to prepare a rich bed for the plants. The plants are set out nine inches apart.

In order to obtain blanched sticks, the plants are earthed up as they make progress ; they should be at least three parts developed before this is done. In "earthing" the soil is gradually moved into the trench, and care must be taken that the hearts of the celery are not soiled. Each plant ought to be carefully tied before the "earthing" is started.

THE CELERY FLY. This insect pest attacks Parsnips as well as Celery. The presence of the Celery Fly is indicated by the appearance of small gray blisters, or patches, on the leaves of the plant. Inside this small swelling,

safely hidden between the leaf-skins, is a small maggot (the larva of the Fly) which mines its way through the leaves and feeds on the plant juice. This greatly interferes with the work of the leaves, and consequently the development of the plant is hindered. The Fly appears in April and places its eggs on the upper side of Celery and Parsnip leaves. When the larva emerges it proceeds to take up its quarters in the leaf itself and the grayish brown blisters, already described, are formed.

The treatment of this pest is more or less one of prevention. The pupæ of the fly spend the winter in

the soil, and therefore the top layers of the soil should be treated with gas-lime. Infested leaves must be carefully picked off and burned, and the plants may be sprayed with a weak paraffin emulsion in April, or dusted when damp from the earliest stages with a mixture of soot and wood ashes.



FIG. 53

CELERY FLY (*Tephritis onopordinis*)

The drawing shows a parsnip leaf attacked by the fly (A). B.—An infested area (natural size). C.—The maggot.

CHAPTER XIII

FRUIT CULTURE



THE FRUIT PLOT. Wherever possible, a fruit plot should be established in the school garden, in fact, no system of school garden teaching can be considered complete if no provision is made for elementary training in fruit culture. The provision of space is the only serious difficulty; the question of expense may be passed over, for it should be remembered

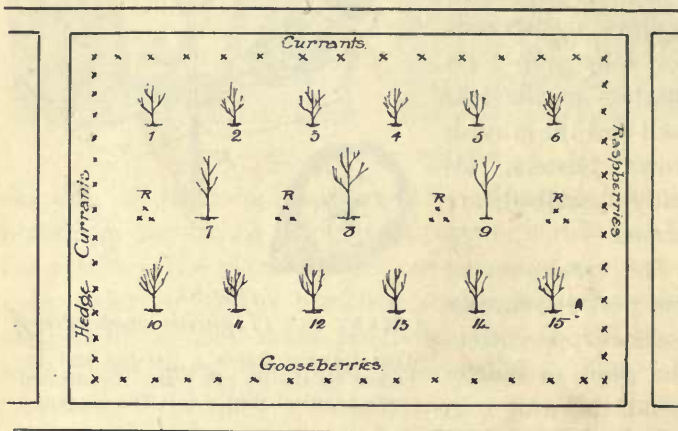


FIG. 54. A SCHOOL GARDEN FRUIT PLOT

1, 2, 3, 5, 6, 10, 12, 13, 15. Bush apples. 8. Half standard apple. 4. A Bush plum. 7, 9. Half standard plums. 11, 14. Pyramid pears.
R = Raspberries.

that the stock of healthy and carefully selected fruits planted will not require replacing year by year as in the

case of the vegetable crops. The expense may be reckoned as an outlay of ten shillings to fifteen shillings per rod, and if the trees are correctly managed from the first there is no call for further expense for some years. An occasional inevitable death may cause incidental expense. The question of space may be overcome, since it is not essential that large areas shall be utilised. A few trees on a small plot will furnish all that is required for one class of fourteen boys. Thus even two rods of ground may be transformed into a very useful although small fruit plot. A much more convenient plot can be acquired by using four rods of ground, and the accompanying diagram, Fig. 54, represents such a plot in actual use in a Surrey school garden. The planting plan, as shown, was specially prepared by Mr. John Wright, V.M.H., and is an object lesson in the economy of using space. It will be noted that by an ingenious arrangement of grouping and spacing the representative fruits are planted so that each commands sufficient room for development. The taller fruits are given central positions in order that sunshine and light have full access to the whole, without interfering with the bush varieties. The bush or berry fruits form the boundaries. The great danger rests in the fact that many growers endeavour to accommodate more trees than can develop under satisfactory conditions. Promiscuous planting and overcrowding are inimical to success and leads to failure as well as waste of time and money. Therefore, when the available space is limited, the number of trees introduced must be correspondingly restricted as tending to ensure success and thus accomplish the object and aim of school gardening. If, however,

the plot at disposal is unlimited, a larger number and a wider variety of trees may be planted, yet, always with due attention to the question of root space and leaf room. There is no economy in overcrowding; on the contrary, it is extravagant waste.

Another reason in favour of the formation of a fruit plot is the value of the winter occupation afforded when the vegetable garden operations are completed or suspended. On favourable days in winter the trees can be given the important attention they require, and much instructive and interesting work may be performed.

The selection of the situation of the fruit plot must be based on several considerations. A sunny position and a southerly aspect are desirable. The soil demands thorough cultivation, and this is best accomplished by bastard trenching. It must be borne in mind that the root development of the fruit trees is more important at the outset than the growth above ground, and that freedom of root growth cannot be obtained in a neglected soil. The question of drainage is of the greatest importance, and success in fruit growing, even on the most modest scale can never be realised in a badly drained soil. The presence of excessive moisture means a lowering of temperature, and provides all the conditions that retard root extension. Although the roots are out of sight, yet it is fatal to the tree if they are out of mind. Therefore, everything that is possible in the direction of deep cultivation must be completed before planting is attempted. The bastard trenching must be carried out with the same thoroughness, but deeper than that recommended in Chapter II, yet due attention must be

given to the warning against bringing the rank, foodless subsoil to the surface. Be it also clearly apprehended that the establishing of young trees is the most important stage in the work entailed by the fruit plot. Carelessness in this work will result in endless worries in subsequent work ; it will call* for replanting and probably the discarding of those trees that have failed through the negligence of the grower. The manuring of the fruit plot must be judiciously carried out, and on no account must fresh, rank manure be placed in such positions that it will be in direct contact with roots of newly planted trees. Such treatment stimulates excessive root growth and causes the production of coarse and fruitless shoots.

Due attention must be given to the manner in which roots carry on the work of supporting the tree. This important function is shared by roots, rootlets, and root-hairs alike and consists in extracting plant food from the soil and passing it into the plant system. Thus the fibrous roots of the tree are of as much importance as the main roots, and require attention accordingly, and they cannot extend sufficiently in a badly cultivated soil.

CHAPTER XIV

SUITABLE FRUITS



THE selection of fruits will naturally depend on the size of the plot, and it is not surprising in the case of small-sized plots that the larger forms of trees must be omitted. In some instances the bush fruits alone are possible, but these will suffice until

it is possible to extend the plot so that Half-Standard and Bush Apples and Plums, and Pyramid Pears may be grown.

In this chapter I shall deal with the stocking of a typical plot, viz., about six rods in extent, but, of course, a piece of a greater area than this need not be discarded as too large.

On such a plot the following fruits should be grown :—

Strawberries.

Bush Fruits : Currants, Red, White and Black.

Gooseberries.

Raspberries.

Bush Apples.

Pyramid Pears.

Bush Plums.

Half-Standard Apple.

„ Plum.

It will be found best to place the Strawberries on the margins, but they can be planted in rows between the trees until the latter attain to such dimensions as to deprive the ground fruit of sunshine. In the event of this position being chosen, the scholars must be impressed with the importance of most careful surface culture.

Small fruits, viz., Currants, Gooseberries, and Raspberries, must be included, and in addition to the bush forms of the first and second, Cordon Red Currants and Gooseberries may be added. It is possible, of course, to raise Currant and Gooseberry bushes from cuttings, yet in the majority of cases the results will not be very satisfactory. It is better to obtain two or three year old trees from the nurseryman for the reason that a good form of tree can only be obtained by skilful and

careful attention. It is easy to strike cuttings, but it is a very different thing to transform them into well-formed bushes.

This matter will be referred to in Chapter XVI.

In the matter of Apples and Pears it is necessary to consider the form of the trees, and this can be regulated in the infancy of each tree by the judicious application of the pruning knife. It is clearly out of the question to attempt the training and culture of standard trees since these take up so much space. For apple growing the half-standard and bush forms are best, and for Pears the pyramidal shape is most suitable. A single or double horizontal Cordon Apple may be trained along one side of the plot, but if the arrangement suggested in Fig. 54 is adopted, this cannot be done. One Half-Standard Apple may be placed in the centre of the plot, and in the same row two Plums, necessarily half-standards, may also be grown.

Bush Apples and Pyramid Pears make it possible to bring the work within the power of the boys. The trees are received from the nursery properly formed, and each year's work consists in careful training and pruning so that these forms are preserved. There is a common belief that fruit trees are only possible in large gardens, but a year's training in the school fruit plot will convince the scholar that small fruit trees are profitable additions to small gardens.

Then again many growers obtain bush forms and expect them to retain the same shape without pruning, with the result that the tree becomes an entangled mass of branch and leaf. Of course, such neglect can never produce

a good yield of fruit, much to the surprise of the thoughtless grower.

A SUGGESTED SELECTION OF FRUITS :—

Strawberries.—Sir Joseph Paxton, Royal Sovereign, Fillbasket.

Red Currants.—Fay's Prolific,

White Currants.—White Dutch.

Black Currants.—Lee's Prolific.

Gooseberries.—Crown Bob, Leader, Red Champagne.

Raspberries.—Hornet, Carter's Prolific.


Apples.—Prince Albert, Mank's Codlin, King of the Pippins, Cox's Pomona, Stirling Castle, Cox's Orange Pippin.

Pears.—Emile D'Heyst, Louise Bonne of Jersey.

Plums.—Monarch, Early Prolific, Victoria.

CHAPTER XV

FRUIT TREE PLANTING

ORRECT planting is the first step towards success in fruit culture. There are many people who regard planting as an absurdly easy operation, yet it must be stated in justification that few of these have any idea of the function of roots and rootlets. Fruit tree planting is quite an easy matter if it is followed out in the proper manner, and in fact it is much easier—and more profitable—to plant a fruit tree correctly than it is to place it carelessly in the ground. We are reminded from our junior days that there is a right and a wrong procedure for every operation, yet

probably, in ordinary gardening, there is no more emphatic illustration of this truth than in the planting of a fruit tree.

In the first place, it is necessary to select the station for the tree, and we will suppose that thorough cultivation has been carried out. Dig a circular hole about eighteen inches deep and three feet to four feet in diameter. Now take the tree and examine the roots, and if these have been bruised or abraded trim off the damaged portions with a sharp knife. Place the tree in the hole and arrange the roots carefully so that they are in a natural position, viz., radiating from the stem and always having a slight downward tendency. Attention to root position is the most important matter. Any able-bodied man can dig the hole but only the able-minded gardener can see that the roots are arranged so that they are able to develop. By this we

do not mean that the operation can be performed by the privileged few, but that it may be done by everyone who cares to take the trouble.

When the planter is convinced that the roots are properly arranged, the next step is to replace the soil. This process

demands much care, and it must be accomplished gradually. If it is useless to fill in the hole at once, for the soil must be placed firmly around the roots. This can

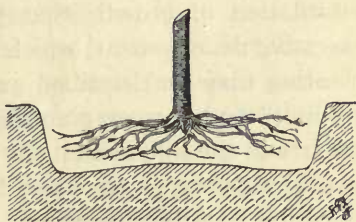


FIG. 55

FRUIT TREE PLANTING

The slightly convex base of the station prevents water from accumulating round the roots.

only be done by gently pressing the soil about them, and under no consideration must the soil be rammed down, for this only results in bruising the roots.

In the case of the smaller trees such as the Currant and Gooseberry, the same process is repeated, although smaller holes are necessary—the same care in the arrangement of the roots and the filling in of the soil should be observed. Raspberries should be treated in the same way. Often the fault of the novice lies in *loose* planting, so that it is quite easy to uproot the tree after finishing, and this is invariably followed by coarse, unfruitful shoots. This is undesirable, and can never happen if the above instructions are explicitly followed out.

Bad planting may be traced to one of two causes, carelessness or ignorance, and the former is quite unpardonable. The results may be the death of the tree, retardation of growth that takes years to correct, or excessive development, which entails root pruning. Bad planting may be described as “sticking the tree in the ground,” and correct planting as the careful placing of the tree in the soil, so that the roots, which are the fundamental support of the tree, have every opportunity of extending. After planting, the trees should be attached to the stakes. These should always be placed in the station as soon as it is prepared for the reception of the roots, and prior to the actual planting, for the driving of the sharply pointed stake through the root system cannot be considered as conducive to healthiness of the root fibres.

Strawberries, although these are not fruit trees, demand especial care in planting, and much depends on the proper

arrangement of the root system when they are placed in the ground. Often they are placed in the soil in such a manner that the roots are matted together, and weak plants are the result. The same care that is taken of large trees is necessary here, the roots being spread out and the plant sunk to such a depth that the crown is just above ground. Then press the soil round the roots so that the plant is firmly supported.

The planting of a fruit tree or a strawberry plant may appear a troublesome process in reference to the detail that must be observed, yet, "what is worth doing is worth doing well," and it is far better to throw the trees and plants on the rubbish heap than to place them in the ground in a slovenly way. Nothing of real good can result from such treatment, for if the trees and plants are started badly, the most expert gardener will experience the greatest difficulty in bringing them back to the path of righteousness. The roots are vital organs, and they are ever ready to carry on their functions correctly and persistently, and no blame can be attached to the nurseryman who supplied the tree or to the soil—be it well cultivated—if the planting is improperly performed. The only remedy for this is replanting, and if a tree has been "stuck" in the ground, the only recourse is to lift it and replant it with due observance of the advice laid down in this chapter.

CHAPTER XVI

SMALL FRUIT

CURRENTS, GOOSEBERRIES, RASPBERRIES, AND STRAWBERRIES



CURRENTS and Gooseberries are known as "bush" or "small" fruits, and although Raspberries are borne on canes and not on bushes, it is better for the sake of easy classification to extend the term to embrace this latter small fruit.

SOIL. In the first place it is essential to prepare a deeply cultivated and thoroughly drained site. This advice in reference to preparation of the fruit plot applies also to Apples, Pears, and Plums. The roots can only develop properly in a friable soil, and therefore the fruit grower must ensure this condition of growth by careful cultivation.

PROPAGATION. Currants and Gooseberries are propagated by cuttings, and Raspberries by suckers or division. Firm shoots of the first and second named must be selected in October or November.

Make a clean horizontal cut across the base of the cutting just below a bud; cut away the top of the shoot

and remove all the buds except three or four at the

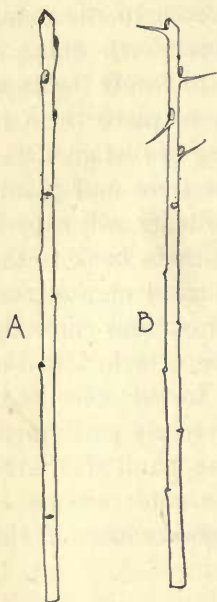


FIG. 56. CUTTINGS

A.—Currant cutting.
B.—Gooseberry cutting.

top ; the cuttings should be from a foot to fifteen inches long when ready for insertion. If many cuttings are made, open a trench with a spade and insert them six inches asunder so that from one-half to three-quarters

of the length of each cutting is in the ground ; press the soil firmly up. Red and White Currants and Gooseberries are treated in this way. Black Currants are propagated by cuttings of one year old wood with a heel attached, and this is planted in

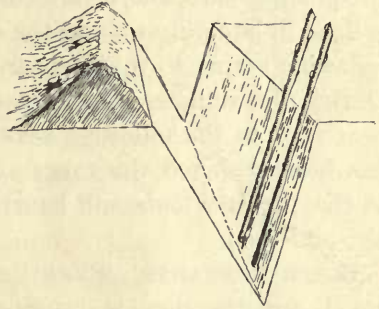


FIG. 57. A TRENCH FOR CUTTINGS

the manner recommended above ; they should be about six inches long, and no buds must be removed. After the cuttings have made a year's growth, the growths should be cut back to two or three buds. They should then be lifted and replanted about two feet apart. Another season's growth is allowed, and the buds will have grown into branches, and the bush has commenced to assert its form. These branches, or shoots, are pruned to about one-third of their length, and the cut should be made just above a bud that will lead the growth *away from the centre of the plant*. The cut should make an angle of about forty-five degrees with the direction of growth. Propagation by cuttings should certainly be incorporated in the scheme of work carried out in the fruit plot.

Raspberries are propagated from young canes divided

from established stools, and only well-rooted ones should be selected, or by rooted suckers. The Raspberry root system is characteristic, and is composed of a mat of very fine fibres. In planting, these must be arranged with the greatest care, and firmly covered with soil. Planting is done in late autumn and the canes are cut down in the following spring so that only five to eight inches remain. During the summer young canes are formed, and these bear fruit in the following season. As soon as the fruit has been gathered the canes are cut out from the base so that the new ones will have the benefit of more light, air, and food.

BLACK CURRANTS. Black Currants bear fruit on new wood, and therefore in pruning, the old wood must be removed. The young shoots must be encouraged, and in this matter the culture of Black Currants differs materially from that of the Red and White varieties. New growth is required, and hence the surrounding soil must be kept well supplied with half-rotted manure, and in pruning, old branches should be removed.

In recent years the Black Currant Mite has caused wholesale destruction among the plants. It is generally known as "big bud," and the appearance of abnormally enlarged buds indicates that the mite is present. Badly infested trees must be destroyed, and whenever the abnormal buds are noticed they must be removed and *burnt*—do not throw them on the soil.

RED AND WHITE CURRANTS. On these, fruit is borne on the old wood, and consequently the new shoots must be cut into spurs when the pruning-knife is used. Some extension of the main branches should be encouraged

each season until the whole of the available space is occupied.

GOOSEBERRIES. Gooseberries have a strong tendency to form thick, impenetrable bushes, and once this state is reached, the grower is face to face with trouble. Under such conditions a heavy crop of small fruit results, and the trouble of gathering it is great. Hence, close attention must be given to pruning, and generally speaking, the advice given under Red and White Currants should be followed. The young growths should be cut back to three or four leaves, but one or two young shoots may be retained on the branches of well-established trees, as they will produce a few exceptionally fine fruits; at the same time, the fact that Gooseberries carry the bulk of their crop on spurs must never be overlooked.

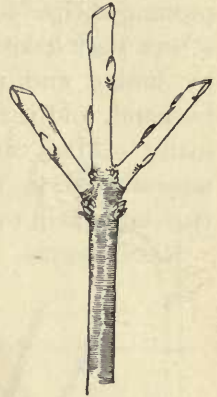


FIG. 58. PRUNING
RED CURRANTS

The new wood is cut back as shown so that the spurs may develop fruit buds.

THE MAGPIE MOTH (*Abraxas grossulariata*). The caterpillar of this moth is very destructive to the foliage of Gooseberries and Currants. The moth itself is a familiar object in most fruit gardens, appearing in July and the beginning of August. Eggs are placed on the leaves and the caterpillars which eventually appear are able to hibernate. For this purpose they may enter the soil below the trees or avail themselves of shelter as it offers itself in crevices. In the following spring, when the young leaves appear, the caterpillars carry on their destructive

work. In June they enter the pupal state and the striped chrysalis may be found suspended from the underside of the leaves or under the eaves of outhouses in the vicinity of the bushes. In order to keep this pest under control pruning helps to dislodge some of the caterpillars; others that have reached the soil may be exterminated by liming and hoeing. The larvæ may be removed by hand, and if the bushes are gently yet firmly shaken many of the caterpillars are dislodged. It might be remembered in the interests of our feathered friends that birds help to remove numbers of this pest.

RASPBERRIES. Pruning detail is not required in the

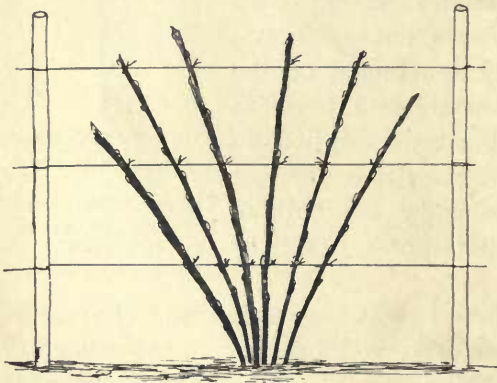


FIG. 59. TRAINING RASPBERRIES

culture of Raspberries, and all that is necessary is close attention to the annual thinning of the stools, and the feeding of the roots. After the crop has been picked, remove the old canes, and in

the following winter cut out the weaker canes formed during the preceding summer. Four or five strong canes are better than twice the number of weak ones. The selected canes should be tied either to single stakes or to a trellis according to the disposition of the stools. It is all-important to remember that freshly planted canes

must be cut back so that the energy of the plant is thrown into the formation of new roots and canes and not wasted on the formation of fruit which, by the way, is sure to be of inferior quality.

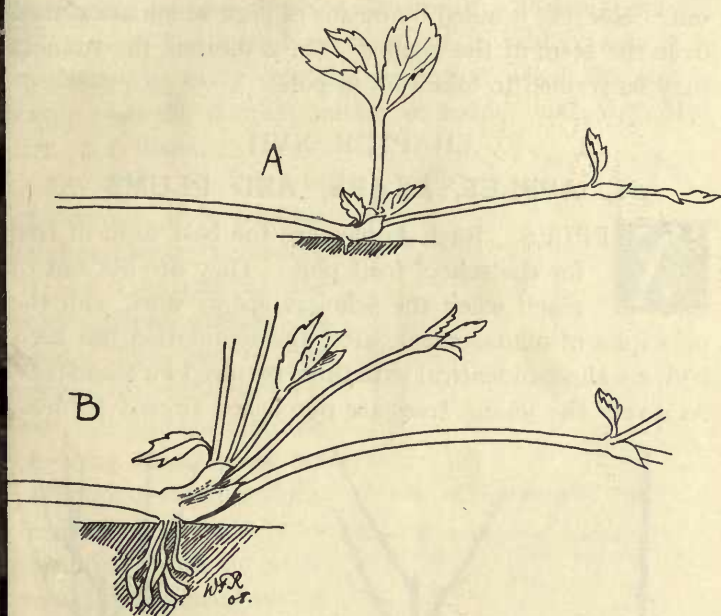


FIG. 60. STRAWBERRY RUNNERS

A shows the roots developing and B represents a more strongly established root system.

STRAWBERRIES. This fruit demands a deep rich soil, and such conditions are best secured on a good sound loam. The plants are placed at distances apart varying from two feet to two feet and a half and should be surrounded by a mulch. It is a good plan to remove the flowers during the first year and thus prevent fruition until

the second year. Propagation is carried on by means of runners which are thrown out by the adult plants. These, if left to themselves, take root in the adjacent soil. They should be removed as soon as roots are formed and bedded out. Rooting is aided by means of pegs which are placed over the stem of the runner. Or, if desired, the runners may be trained to take root in pots.

CHAPTER XVII

APPLES, PEARS, AND PLUMS



APPLES. Bush Apples are the best form of tree for the school fruit plot. They are not out of reach when the scholars are at work, and the principles of management, after the foundation has been laid, are almost identical with those required for standards. As a rule the young trees are purchased already formed,

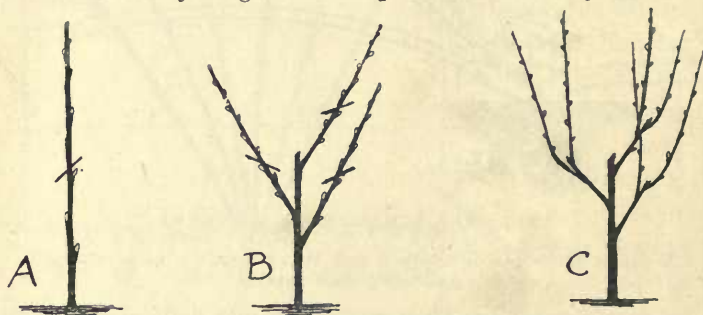


FIG. 61. FORMING A BUSH APPLE

and all that is necessary is close attention to the pruning year by year, so that the compact habit is preserved. A Bush Apple may be formed by heading back a maiden tree one year old (from the bud or graft) so that about

three buds remain. The shoots that are thrown from these are cut back the next season and the six or eight resultant shoots form the foundation branches; if these are subsequently pruned so that the growth is led outwards, an open bush is the result. Planting should be done in October, November, or in March, and it is necessary to carry out this operation when the soil is easily worked—it must neither be sodden with wet, dust dry, nor frozen.

PRUNING. By means of pruning, it is possible to concentrate the energy of the tree and at the same time control its form. The use of the knife or secateurs is essential, and the methods of using these tools are of the greatest importance. Pruning cannot be successfully carried out without careful consideration

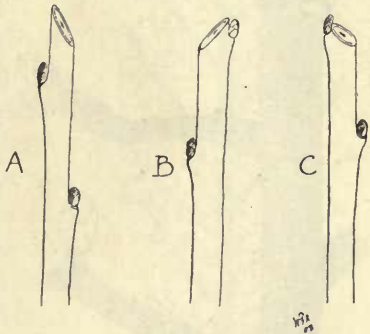


FIG. 62. PRUNING CUTS

A.—Bad cut leaving a snag. B.—Good cut. C.—Bad cut injuring bud.

on the part of the cultivator of the habits of the tree to be treated. Generally, Apples and Pears present little difficulty in this respect. In the case of Apples, the fruit is usually borne on spurs on the old wood, yet there are instances in which the fruit appears on the extremities of the young wood, and consequently in such cases the new growths must not be pruned in the following winter, but these examples are exceptional. The aim in pruning Apples must be to remove young growths,

and this must be done in such a way that exuberant wood is removed in order to open the tree fully to the influences

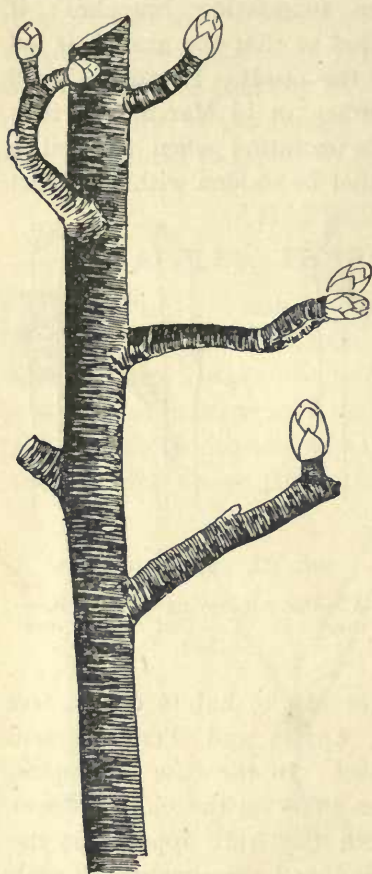


FIG. 63. FRUIT SPURS

of sunlight and air. In the case of Bush Apples grown on the school plot, extension growth must be carefully controlled, and the pruning knife must be run over the trees in the spring following the autumn of planting. The branches should be cut back to a wood bud, so that about two-thirds of their length remains, and the cut must be made to a bud which points outwards—this ensures that the centre of the tree is not choked by consequent growths.

In the case of trees making excessively luxuriant growth lifting and replanting must be had recourse to, and at the same time the roots should be pruned with a very sharp knife.

PEARS. This fruit offers less difficulty, since the yield is borne on the old wood, and pruning is carried out in order to remove the young

shoots. As in Apples, this operation may be executed in two stages. The first step is to reduce the young shoots in summer and the second is to cut back in winter to two or three buds. The summer pruning must not be too severe, and only the summer shoots are removed so that six to eight leaves remain.

PESTS. Apples and Pears are subjected to numerous pests, and careful cultivation is very necessary in order to safeguard the trees from the ravages of certain insects and fungi. Among the former are American Blight or Woolly Aphis, the Codlin Moth, Winter Moth, and Apple Blossom Weevil, while the chief among the latter is canker.

AMERICAN BLIGHT OR WOOLLY APHIS (*Schizoneura lanigera*). One cannot mistake the presence of American Blight, because of the patches of white, downy flakes that develop on infested trees. These white, woolly appearances are the aphides themselves, or at least the quaint covering which they bear. Directly these signs of invasion are detected, steps must be taken to ensure the removal of this insidious pest. If it be neglected, serious



FIG. 64. FORMING
A CORDON TREE

The laterals are cut back in summer to six leaves as shown and in winter to two good buds.

harm to the trees is assured, for not only does the Woolly Aphis cause direct destruction, but it predisposes the

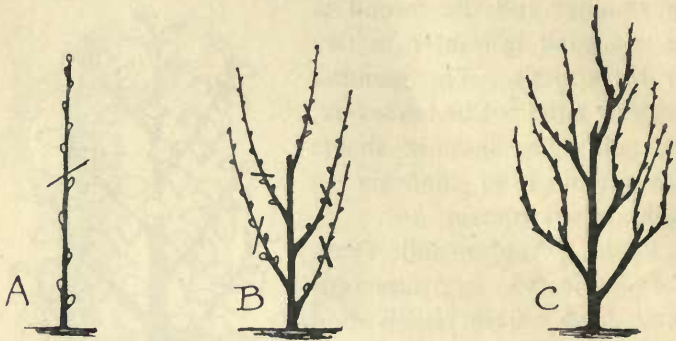


FIG. 65. FORMING A PYRAMID

A.—Maiden tree headed back. B.—Laterals cut back to three buds. C.—Pyramid or upright bush tree.

infested parts of the bark to attacks of canker when its ravages assume serious proportions. The best treatment is the application of a brush, dipped in sweet oil, methylated spirit, paraffin, or petroleum, to the colonies of aphides, or spraying with a solution of paraffin, soft soap, and quassia. This operation must be carefully done and repeated directly fresh developments of the pest occur.

THE CODLIN MOTH (*Carpocapsa pomonella*). The Codlin Moth is a serious pest to apple growers, and its ravages, if unchecked, may render the orchard worthless. The moth places its eggs in the eye of the fruit in late spring, just before the eye closes. The egg hatches, and a small caterpillar, familiar to most people, commences its journey in the course of which the pips are eaten, the fruit falls, and the enemy promptly leaves it to take

up its pupal quarters in the ground. In consequence of this destructive work the Apple is rendered more or less unfit for consumption. All Apples which fall should be consumed at once or destroyed so that the larvæ occupant does not complete its cycle of changes to appear as a new enemy.

The best remedies are sprayings of Paris Green, and liming the bark of the tree. The spraying must be carried out before the eye of the fruit turns down, so that the egg or the larvæ is destroyed. After this time spraying is useless and the larvæ develops unhindered.

WINTER MOTH (*Cheimatabia brumata*). The females of this species are wingless and crawl up the tree to place their eggs in crevices in the bark and on spurs. When the larvæ appear they feed on the buds. The male moth is commonly seen on the wing during the evenings in the last week or so of the year. Before October the trees may be grease-banded in order to intercept the females on their journey up the tree. The stems or shoots should be sprayed in order to destroy the eggs and larvæ of the pest. Moss or lichen aid in harbouring the eggs of the moth. Spring sprayings with Paris Green are effectual checks; while winter washings with a solution of caustic soda and commercial potash are excellent.

CANKER. This is a fungoid pest, persistent in character, and difficult to exterminate. The spores attack unhealthy



FIG. 66
AMERICAN
BLIGHT ON
CANKER WOUND

American Blight or Woolly Aphis (*Schizoneura lanigera*) on cankered branch of an apple. The white patches are the aphid colonies.

portions of the bark, and on account of this, great care must be exercised in order to avoid wounds on the outer

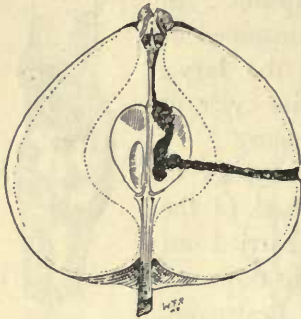


FIG. 67

APPLE ATTACKED BY
CODLING MOTH

Section of an apple to show
the destructive effect of the
larva of the Codling Moth.

covering of the tree. The rubbing of one branch on another when pruning is neglected, or the wounds caused by frost are a few of the indirect causes of the appearance of canker. The infested areas, when small, may be carefully cut away and the wound smeared with Stockholm tar. When the disease is acute the tree should be either removed or headed back and grafted with a strong strain such as Bramley's Seedling in the case

of Apples, and Pitmaston Duchess in Pears.

PLUMS. The directions already given in reference to preparing the soil, manuring, and planting, must be carefully followed out in the culture of stone fruits. Plums, however, differ in habit of growth and fruit-bearing from Apples and Pears. In the latter, the fruits are borne on spurs, while in the case of stone fruits, the crop appears on spurs and extension shoots. There is a wide variation in the habits of fruition, yet, since Apricots, Cherries, Nectarines, and Peaches, for various reasons, are not likely to find their way into the school plot, it will suffice to state that Plums bear on wood from two to six years old. Hence, care must be taken in pruning the trees not to remove the older wood that

will immediately yield fruit. At the same time it will be found necessary, for the sake of shape and in order to keep the tree open, to remove young wood. This operation calls for great care.

DISEASES. In addition to the caterpillar pests that often attack the foliage, the Plum is liable to a disease known as gumming. It is common to Plums, Cherries, and Peaches, and it generally results in the loss of the tree when the disease is acute. Hard pruning is one cause of gumming, and undoubtedly poorness of soil has a great influence in its development. Should it appear in a young tree cut the infested growth clean out and feed the tree generously but very carefully with some stimulating food with a view to encouraging it to grow out of the disease. In the case of badly-infested old trees the best course to pursue is removal to the fire since these cannot be cured.



FIG. 68
THE EFFECT OF
THE CANKER
FUNGUS

CHAPTER XVIII

GRAFTING AND BUDDING



GRAFTING and Budding are methods of propagating fruit trees, and the simple process of grafting, with the not at all difficult operation of budding, must be introduced into the scheme of work on the school fruit plot.

GRAFTING. The possibilities of grafting are numerous, but in the main they may be stated as aiming at the

increasing and improving of varieties of fruit trees.

For this purpose ripened shoots of a season's growth are selected; these

are known as the *scions*. The rooted stem to which the scion is affixed is called the *stock*. The only necessary conditions

are:—(1) That the scion shall be a ripened young shoot.

(2) That the stock shall be well rooted. (3) That the stock and scion shall belong to the same generic order—and finally

that the operator shall possess a certain amount of skill.

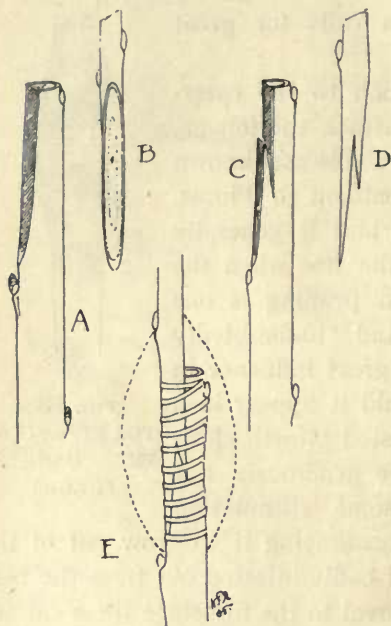


FIG. 69. WHIP GRAFTING

A.—First cut made on stock. B.—First cut made on scion. C.—Second cut forming a wedge-shaped tongue. D.—Second cut on scion. E.—Graft completed and bound with bast or raffia; finally air is excluded by means of clay, or wax, as indicated by dotted lines.

There are many forms of grafting, and of these, *whip grafting* is the most common. It is only possible when the stock and scion are of nearly the same thickness. When the

stock is much thicker than the scion, *crown grafting* is

resorted to; thus badly cankered apple trees may be crown grafted in order to improve the growth.

The object in all grafting operations is to bring the cambium tissue layer of the scion to fit exactly with the corresponding layer of the stock. Therefore it is essential that the cuts shall be prepared very carefully.

WHIP GRAFTING. In whip grafting, a long sloping cut is made through the scion and the stock. A second cut is made in each and a wedge-shaped portion removed from the stock, and the same process is carried out with the scion. The tongue, thus formed in the scion, is fitted into the stock and the graft is firmly tied with bast or raffia and grafting wax or clay is carefully placed round it so that air is excluded. The operation is clearly shown by the diagram in Fig. 69.

CROWN GRAFTING. This is of value in extensive fruit growing, but will hardly find general acceptance in the school plot. However, it is interesting as an experiment in grafting. The scions are prepared by cutting the bases into wedge shapes and these are placed into slits made in the stock. The whole graft is held firmly together by bast or raffia, and clay or grafting wax is placed over it. This is removed when the growth commences in the scions.

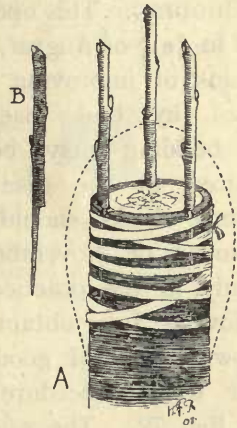


FIG. 70
CROWN GRAFTING
A.—Stock. B.—Scion.

In all kinds of grafting the selection of the scion is of the greatest importance. Healthy, strong shoots must be chosen, and these may be preserved after cutting by placing them in a moist soil in a shaded station. The grafting is carried out in spring, just as the sap is rising in the stock, and while the scions are still dormant.

BUDDING. This operation is carried out in July or August, and provides a means of improving fruit trees and roses by bud insertion. Practice in budding may be well demonstrated in the case of the brier. Strong stocks should be selected in October or November and planted firmly in the practice plot; in the following July obtain some matured growth buds of good rose varieties. The usual procedure is made clear by Fig. 72. The woody part of the bud is removed and the bark cut into a lozenge or shield shape. The "pin" of the bud, which is visible on the inner side of the shield, must not be injured. In the bark of the stock, make a T-shaped cut and gently raise the bark on each side with the handle of the budding-knife. When this has been carefully done insert the shield, close the bark, and bind the bud firmly in with bast or raffia. The ligature



FIG. 71
SADDLE GRAFTING

A. — Stock. B. — Scion. The graft is eventually tied firmly with a ligature and cayed.

is removed when active growth is evident. In the following March the branch of the brier stock is cut back.

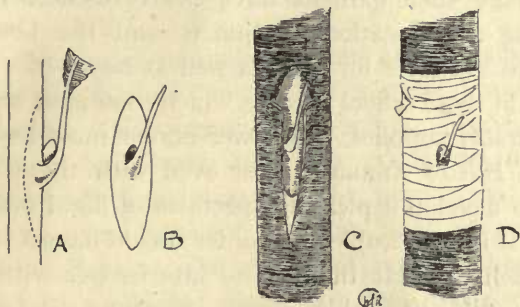


FIG. 72. BUDDING

A.—Selected bud. B.—Front view of bud and shield with leaf removed. C.—Shield inserted in the bark. D.—The bud securely held by a bast or raffia ligature.

CHAPTER XIX

FLOWERS



Present the culture of flowers in the school garden is, generally speaking, in its infancy; yet undoubtedly, with the widening of this important branch of school work, flowers will receive the attention which undeniably is due to them. Apart from the floral charm and pleasure that are associated with the culture of our commonest garden flowers there is an additional value inasmuch as these furnish the Nature lessons with ample material for plant study. In

the flower plot the scholar may observe the plant accomplishing its life history and to a certain extent he is able to control the conditions of its growth. Both in America and Germany such gardens have clearly demonstrated their value as educational adjuncts and the benefits realised are available for girls as well as boys.

Except in those school gardens which command especially favourable supplies, the flower border must be content with Hardy Annuals. Yet even with these it is possible to develop a pleasing spectacle of floral beauty. Wherever it is practicable, the border should have a situation to itself, so that there is no interference with the culture of the vegetable crops. However, in many instances the annuals will be sown at one end of the plots and although the effect is not comparable with that obtained from a wider border the result is good. If a long strip, about two yards wide, be available it will be possible to establish herbaceous plants. Consequently propagation by division and cuttings may be demonstrated. Carnations, Pinks, Phloxes, and Chrysanthemums may be grown; bulbs may be introduced, so that a monthly procession of blossoms is secured. Such an endeavour, commendable as it is, lies, possibly, beyond the power of the average school garden.

HARDY ANNUALS. The culture of Hardy Annuals may appear a very easy matter, and so it is if it is carried out carefully; often the grower presumes on the hardiness of these plants. As with the culture of all plants preliminary operations are demanded, and consequently the soil must be carefully prepared, manured, and made fine in texture. The seeds should be sown *thinly* and

covered with soil to a depth of about half an inch, more or less according to the size of seed. When the seedlings appear, they must be thinned so that each commands ample space for development both above and below ground.

A selection of annuals suitable for the school flower border may include Candytuft, Coreopsis, Linum, Lupin, Mignonette, Nasturtium, Nemophila, Shirley Poppy, Sunflower, and Sweet Peas. In arranging the relative positions of these plants in the border due attention must be given to height of plant, habit of growth, and colour of flower. The culture of each of these annuals should be conducted along the lines laid down in the general culture notes given.

SWEET PEAS. These beautiful and easily grown flowers lend themselves pre-eminently to the decoration of the border. They are best grown in clumps for this purpose, and a pleasing effect is secured if the clumps be arranged alternately with tall-growing Sunflowers. The stations must be prepared in autumn and the soil must be worked to a depth of two to three feet. At the base a layer of well-decayed manure should be placed and the hole is then filled with fine, friable soil. In mild localities the seeds may be sown outdoors in September or October, but generally the sowing must be deferred until March. The seeds should be placed at least four inches apart, and where exceptionally strong plants are desired, one and a half feet is not too much to allow the plants. When the seedlings are about four inches high thin twigs should be fixed beside them so that the tendrils may secure a hold and thus prevent the plant from falling

to the ground. Later, strong hazel sticks must be obtained for staking, and a mulch of manure should be placed on the soil round the plants in order to conserve moisture.

BIENNIALS. It may be found possible to introduce a few Biennials into the border in order to supplement the Annuals. Of these, Wallflower, Canterbury Bell, Evening Primrose, and Sweet William present themselves as suitable subjects for culture. Sowings in beds may take place in March with due attention to the cultural notes given under Annuals; the plants are moved out to the border when required. These come into flower in the second year of growth, hence sowings are made annually in order to secure plants for the following year.

GLOSSARY

- Annuals**—These are plants which develop from seed, flower, and produce seed in one year ; in other words they complete their life history in one season, *e.g.*, Peas and Broad Beans.
- Aphis**—This is a small insect that obtains food from the juices of plants ; they are generally known as “ plant lice ” and belong to the order of insects called the Hemiptera or half-winged insects.
- Artificial**—These are chemical manures, such as Nitrate of Soda.
- Axillary growths**—These are the shoots that grow in the axils on the stem ; *viz.*, in the angle formed by the stem and leaf.
- Biennials**—These are plants that take two years to complete their life history, *e.g.*, Turnip and Beet.
- Budding**—A process by which fruit trees and Roses are propagated. See page 118.
- Bush**—A name applied to a compact form of fruit tree.
- Blight**—A general name which is given to insect and fungoid pests.
- Bordeaux mixture**—This is used as a spray or wash for fungoid pests, especially Potato disease, and is made as follows :—Dissolve 2½ lbs. of sulphate of copper in hot water and 1½ lbs. of fresh quick-lime in cold water ; add the solutions and make up to 20 gallons by the addition of water.
- Compost**—A mixture of leaf mould and manure.
- Cotyledons**—The seed leaves or lobes of the seed.
- Cruciferæ**—An important order of plants of which the most familiar member is the Cabbage.
- Clamp**—A storage for root crops. (Saxon *clam*, a bandage, *viz.*, that which holds anything.)
- Dibber**—A tool used for planting.
- Friable**—A term applied to soils which are in good physical condition and therefore can be easily broken up.
- Fungicide**—Sprays or washes that are used for the destruction of fungoid pests.
- Grafting**—A means of propagating fruit trees. See page 115.
- Haulm**—A term applied to the stems of Potatoes, Beans and Peas.
- Ichneumon**—A small insect that places its eggs in living caterpillars, and as the grubs develop the host larva is gradually killed.
- Insecticide**—Remedies employed for the destruction of insect pests.
- Kainit**—A chemical manure.

Larva—A caterpillar or grub.

Legumes—Pod bearing vegetables.

Leguminosæ—The Pea family.

Ligature—The bast, rush grass or raffia which is tied round grafts and buds. A ligature is also employed for attaching a tree to a stake.

Muriate—An old name for a chloride.

Mulch—A dressing placed on the soil in order to prevent rapid evaporation.

Paraffin emulsion—This mixture is made as follows :—In $1\frac{1}{2}$ gallons of water place 4 ozs. of soft soap and 4 ozs. of quassia and boil ; while the mixture is boiling add a wine-glass full of paraffin.

Piumule—The stem shoot which appears in germination.

Perennials—Plants which live a number of years.

Pruning—The removal of the growth shoots from fruit trees for the purpose of promoting fruitfulness. See page 109.

Pyramid—A name given to a certain form of fruit tree.

Pupa—The chrysalis.

Paris Green—This mixture, which is a dangerous poison, is prepared as follows :—One oz. of Paris Green is mixed with 20 gallons of water.

Quassia—This is an insecticide, and is made by allowing $\frac{1}{4}$ lb. of quassia chips to soak in one gallon of water.

Raffia—This is tying material which is indispensable to the gardener.

Radicle—The root shoot, which is seen in the early stages of germination.

Scion—The ripened shoot which is used in grafting.

Stock—The stem of the fruit tree on to which the scion is fixed.

Secateurs—An instrument especially constructed for pruning.

Standard—A tall growing fruit tree with a clean stem.

Spores—The small bodies which develop on matured fungi and ferns, and by means of which new plants are reproduced.

Spit—The depth of soil moved in digging.

Subsoil—The layer of earth found below the surface soil.

Tap-root—The main root of a plant.

Tilth—The condition of the surface soil secured by very careful cultivation.

Trenching—Deep digging by which the subsoil is brought up and becomes surface soil ; in bastard trenching a similar depth of soil may be moved, but the layers retain their positions. See page 14.

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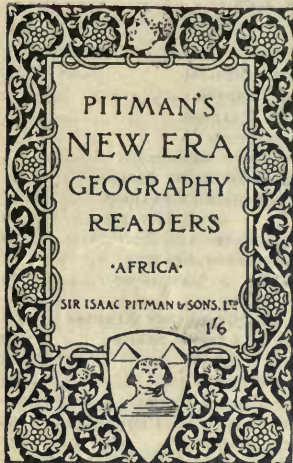
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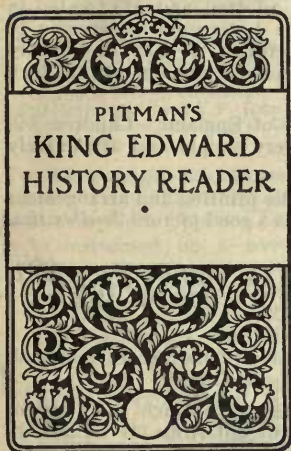
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