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THE GARDEN PRIMER



GRACE TABOR



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THE GARDEN PRIMER



A really successful garden is well within the reach of any beginner who will try to master the principles of gardening as outlined in the following chapters rather than burden his mind with details

THE GARDEN PRIMER

A PRACTICAL HANDBOOK ON THE
ELEMENTS OF GARDENING
FOR BEGINNERS

NEW EDITION, REVISED AND ENLARGED

BY
GRACE TABOR

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TO
THE GARDEN'S APPRENTICES
THAT THEY MAY SERVE JOYOUSLY AND WELL
THE AUTHOR DEDICATES
THIS LITTLE BOOK

PREFACE

TRUE to the name which it bears, this small volume presents only the elementary principles of gardening, its aim being to give these simply and, at the same time, completely. To this end it "begins at the beginning," assuming that the student has no knowledge whatsoever of the subject.

The tables and formulas included have been carefully revised and brought up to the last moment of scientific experiment, and the author's indebtedness to the Department of Agriculture at Washington is here-with gratefully acknowledged, particularly for drawings of insects, from which the illustrations were re-drawn. The nomenclature of Bailey's "Cyclopedia of American Horticulture" has been adhered to throughout.

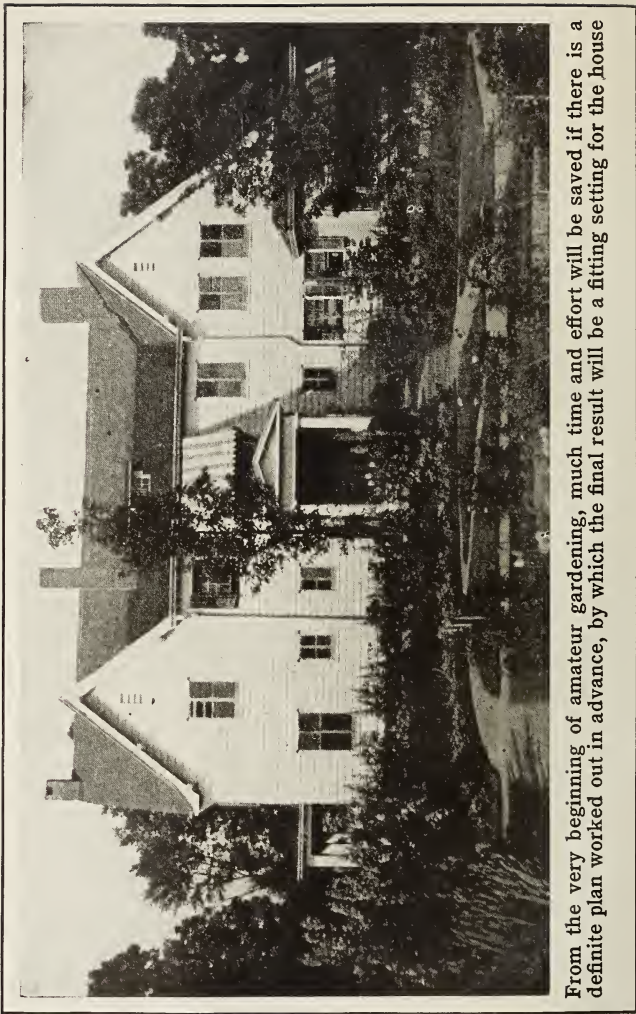
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From the very beginning of amateur gardening, much time and effort will be saved if there is a definite plan worked out in advance, by which the final result will be a fitting setting for the house

I

INTRODUCTORY

A GARDEN is alive—is a wonderful manifestation of life in many forms—with the deepest mystery of mysteries lying at its heart. All the miracles of creation are its commonplace, hourly incidents; its still activity holds the secret which alchemist and sage have ever sought and will ever go on seeking, until they find—or until they and the world cease to be.

Gardening is therefore a wonderful privilege, and should be approached as such. Not only are its most arduous tasks lightened under this view of it, but the garden itself becomes something very different from what it has ever been—becomes a great inspiring teacher or the embodiment of a great philosophy, or—a fairy tale come true, according to the temperament of the gardener.

A garden is not only alive itself—it is the support and sustenance of all life in the world, right up the scale to man. Without vegetation we should perish, promptly and ignominiously, meat eaters and vegetarians alike. So the garden's importance can hardly be exaggerated, or the need for intelligent study of its

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many widely diversified factors be too strongly emphasized.

The smallest plot of earth affords a field for study and work, even though it does not afford a "field," in the broader sense, for raising crops. And indeed it is far better to begin gardening operations little by little, on a little space, than to undertake much at the start. So many problems present themselves at the same time—they come so thick and so fast—that it would take a superhuman energy and nimbleness of wit in the beginner to cope with them all successfully. Do therefore a little, and do it well; next year do a little more, or do something quite different—then do both these things and add something new, as opportunity presents. This is the way to learn gardening and learn it thoroughly.

For a small border anywhere, or for the treatment of isolated small places, a detailed planting diagram of the space is not of course necessary, unless shrubbery is to fill it. But such a diagram will always help in making successful color and height combinations, and in starting things right, even in a small space; so, although herbaceous growth usually becomes impatient of the limitations which a plan imposes and does pretty much as it pleases after a season or two, I should advise the beginner especially to work out, on paper first, a general pattern from which he will later work out a garden upon the ground.

II

KINDS OF PLANTS

HARDY PERENNIALS are plants that withstand the winter in the ground and live for years, often indefinitely. They form increasingly large clumps which may be divided from time to time to make new plants, and these may be transplanted as desired, usually in the fall. Perennials may also be raised from seed planted in the spring or in late summer and will bloom the following season. Hardy Perennials include Trees, Shrubs and Herbs, and do not require a winter covering.

HARDY ANNUALS are plants that are grown from seed in the spring, last through several months of summer, and then die. The seeds may be sown in the open ground in April or in May, or under glass frames or in flat boxes indoors in late February or March.

HARDY BIENNIALS are sown one year, bloom the next year, and then die. These should have a light winter protection of straw, or leaves held down with brush. The seeds are sown the same as annuals.

HALF-HARDY PERENNIALS and half-hardy biennials are usually started under glass, but may be sown

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in the open ground after May 15. They require winter covering.

HALF-HARDY ANNUALS are to be treated in the same way as tender annuals, requiring, as they do, the full time of a long summer in which to develop. They should not be sown out of doors until after June 1.

TENDER PERENNIALS require still more care in starting them. Sow under glass and do not transplant to the open ground until after May 15.

TENDER BIENNIALS may be treated as tender perennials.

TENDER ANNUALS are sown under glass in early spring and the seedlings protected from both excessive sun and cold. They are transplanted from flats to pots or boxes and finally set out after May 25, by which time they are well grown.

SELF-SOWING plants are those which perpetuate themselves through the seed which they drop upon the ground around them. They cannot be depended on to come up in just the right place, but they may usually be transplanted. Poppies, however, are among those self-sowing plants which do not survive transplanting and therefore must be weeded out or allowed to remain where they spring up.

SHRUBS AND TREES are *woody stemmed* plants which differ very little, actually, from each other. Usually a shrub has many branches which start at the ground, while a tree has a single trunk. This is not uniformly true of either, however, and there is really

KINDS OF PLANTS

only an arbitrary distinction; a small tree is called a tree-like shrub, while a shrub attaining to 30 feet in height is referred to under the same term. The line between the two cannot be sharply defined.

CLIMBERS are plants of *weak stems*, sometimes tall and sometimes low growing, which cannot lift themselves without the aid of some support. They may be in any one of the classes mentioned above and they may have woody or juicy stems. Those which twine around their support are, strictly speaking, *vines*; climbers raise themselves by means of tendrils, aerial rootlets or some special device provided for the purpose. Thus all vines are climbers, but all climbers are *not* vines. Nurserymen commonly mean tall growing plants when they use the term *climber*; lower growing kinds they define as *trailers*.

A difference of a single degree of latitude has a marked effect on many plants, though it is not distance north or south alone that tells. Some regions, for instance, from their topographical peculiarities, may be particularly adapted to the growth of certain things which ordinarily would not be hardy in that latitude; while possibly other localities further south are unfavorable, by reason of their configuration, to the cultivation of even lustier species. Altitude enters into the matter to a certain degree, likewise the texture of the soil, the proximity of large bodies of water and the direction of the prevailing winter winds.

The knowledge that all perennials are not as easily raised from seed as most annuals, and that the latter

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produce an immediate effect instead of delaying a season, makes the latter more popular in one sense. No garden is complete without both, however, though the beginner will do well to understand only a few of either and those of the simplest and easiest culture.

Of course it is apparent that under suitable climatic conditions the tenderest annual in the world might be perennial—that is, it might live indefinitely from year to year, either from its roots or from self-sown seed; while it is equally apparent that the hardiest perennial of a North American garden would be only an annual if carried sufficiently far north from its native habitat.



There are wonderful decorative possibilities in the vines and climbers—the true vines twining around their support and the climbers that raise themselves by some other means



It is beyond the power of any man to know even half the members of the vegetable kingdom, but what knowledge is possible will more easily be added to if he learns to know each plant by its botanical name

III

NOMENCLATURE

AT first, plant nomenclature, or the name classification of plants, may appear a staggering proposition—but do not be discouraged. It is not half so bad really as it looks, nor as it sounds when one is beginning. And your enjoyment of every growing thing will be very much keener if you make its acquaintance under its own true name instead of under some dubious nickname which may or may not fit.

The true botanical name of a plant has been bestowed upon it for some definite reason, by those who knew what they were about. It fits—and it means something. Learn it; pronounce it in sections, just the way it is spelled; nine times out of ten you will have it right—and the tenth time is not going to matter.

Of course no one in his right mind will speak of familiar flowers under their Latin names in ordinary conversation. We shall not gather armfuls of *solidago Canadensis* when we pick goldenrod, nor exclaim at the fragrance of *Hemerocallis* when the old day lilies are in bloom. That is not why one is urged to learn

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them; but there are very many things which we already know commonly under their true names. Why not know all of them? By doing so you will find yourself able to trace relationships among plants and plant families which you have never dreamed of.

There is, for example, the gigantic yet delicately lovely moonflower which blossoms only in the evening, the ever alluring morning-glory which opens with the sunrise, and the lacy foliated cypress vine which bears its tiny, starry flowers all day, the same as other plants—all members of a family named *Ipomoea*, and all sharing a peculiar family idiosyncrasy in the shape of a toughened seed which must be soaked or filed before planting, in order to promote free germination. This is a very extensive family by the way, comprising something over three hundred members living in all parts of the world, each bearing a distinctly traceable resemblance to its kin.

Perhaps it will help to a better understanding of the matter if we compare the name of a plant to the name of a person. For instance, a certain individual is named "Brown," let us say; this is equivalent to a certain plant being named "*phlox*:" it is the Generic, or Family, name. But there are many persons named Brown; which is he? He is John Brown perhaps, or James Brown; this is the same as the Phlox being *phlox paniculata* or *phlox Drummondii*, the names being transposed with plants, just as we find personal names in the directory. These names—*paniculata* and *Drummondii*—are the Species names,

NOMENCLATURE

corresponding to the Baptismal names John or James.

But the identity is not yet sufficiently clear, for there may be several John or James Browns. Still further individualization is necessary—so we say the blonde John Brown, or big John Brown—that is we describe him in some way that distinguishes him unmistakably. And this brings us to the final portion of the name—the portion that stands for Variety—and we have *phlox paniculata*, *Coquelicot*, or *phlox Drummondii*, *grandiflora*. In the first instance it is the color of the flowers that is referred to by the name *Coquelicot*; in the second it is their very large size that is indicated by *grandiflora*.

You will find Family, Species and Variety names all spelled with both capital and small initial letters. This is perfectly right though it may look queer, for the rule is that capitals are used only when a proper name furnishes the root for the plant name—*phlox Drummondii* for instance is a Phlox named for Drummond, who collected its seed—while small letters are used at all other times. Unfortunately many are not as careful in this respect as they ought to be and mistakes are rather common.

There are, of course, many more divisions of plants than the three here given, but the others are of interest and importance to the botanist only. The practical gardener is not keen about marshalling great families into still greater classes, or clans and cohorts, and these again into some still larger group, with a more compre-

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hensive title—and all things considered, it is probably fortunate that this is so. One cannot but feel that the garden would suffer if it were otherwise, for the subject is absorbing, once it is undertaken—and proportionately exacting in the matter of time.

Common or popular names vary in different parts of the country so greatly that they are absolutely unreliable. Botanical names, on the contrary, are as fixed as the laws of the Medes and Persians; they come easy, once you get started; and you can order the thing you want from practically any dealer under the sun and be sure you are getting it right.

IV

THE SOIL

ONE thing essential to a garden, and without which there can hardly be a garden, is proper soil. It is not necessary that the beginner should go into an exhaustive study of the subject, but a general acquaintance with the physical characteristics at least, of the various kinds of soil, is imperative. Nothing can make up for a lack of understanding of this.

In the first place soil is classified in three ways: *first*, according to its origin, which means according to the rock from which it was derived—whether from limestone, sandstone, or from granitic formations, for example; *second*, according to its chemical properties—whether calcareous, alkaline and so on; *third*, according to its physical or mechanical properties—whether dry, moist, stony, gravelly, clayey, sandy, or loamy. For the present, however, we will overlook the first two classifications, giving attention to the third only, *i. e.*, the mechanical or physical properties.

SOIL is made up of particles of broken-down rock combined with decomposed organic (or living) matter. The size of these particles, their relation to each other,

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the proportion between them and the air and water which they retain in the infinitesimal crevices separating them—these are the things which govern the physical characteristics and the soil texture; these, clearly understood, make it possible for anyone to follow a line of common-sense reasoning and arrive at the right thing to do to put any soil in the condition most favorable for supporting vegetation. For soil may be modified almost as one chooses, especially within the area one has at his disposal on the average home grounds.

DEEP SOIL means that having a depth of at least eight inches from the surface to the less productive sub-soil.

LIGHT SOIL is a term that has nothing to do with the actual weight, but means loose or sandy—open textured, the contrary to **HEAVY SOIL**.

LOAM is a soil in which the sand, silt and clay are properly balanced, making it mellow and friable. This is the ideal soil most generally favorable to plant life because, being a combination of sand and clay—of large and small soil particles—in about equal proportions, it retains moisture in sufficient quantity to supply plant food in solution, and at the same time it is properly aerated. Air is an important factor in soil and needed by the roots of plants quite as much as water.

The first thing toward actual garden making for the beginner to do, therefore, is to determine which side of the balance between sand and clay is over-

THE SOIL

weighted in the soil with which he has to deal, and how much it is overweighted; there is a simple test which will show, approximately and near enough.

Go out into the garden or onto the ground where the garden is to be, and turn up a spadeful of earth there three days after there has been a rainfall. Is it powdery and light? Then sand predominates—and when sand predominates organic matter is what is needed to bind the particles together.

Is it sticky and like putty, retaining the imprint of your fingers? Then it lacks sand and has correspondingly too much clay; so it is sand or some loosening agent that is the thing required.

Ordinary manure is as good as anything you can get for supplying the needs of a too sandy soil, while deep plowing, which gives the water a chance to escape from clay, is often all that an ordinarily heavy soil that has lain unworked, requires to make it into a friable loam. If this does not lighten it enough, however, a dressing of lime should follow—and sand may be worked into it, or coal ashes, or both, if it still remains soggy and stiff.

Begin your garden by doing this work with the soil. The weathering of it during the winter will help greatly, for the action of the frost and sun has a decided physical effect that should be taken advantage of whenever possible. With a spring beginning there is no time for these to do their portion of the work—but with a start made in the fall there are from six to seven months ahead, during which the elements

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may have free rein. Turning up the ground in autumn is indeed sometimes recommended, even in old and established gardens, though the work should not be done at a time when the soil is wet.

With outdoors looked after, pay particular attention to all that the catalogues and garden literature have to say about soil. You know what they mean when they talk about sandy loam, or clay loam, or just plain loam, and you know which yours is. What have they to say about your particular kind?

Never mind if they do not agree with each other or with what may be said herein; read them. You will find something to think about—you will get ideas—you will begin to appreciate how much there is of interest about this very common, ordinary dirt under our feet that we have always taken for granted. Our very lives depend upon it, literally. Isn't it worth studying a little bit?

V

SEEDS AND SOWING

AS there can be no successful garden without proper knowledge of the soil, neither can there be a good garden without some knowledge of seeds. The gardener can never hope to know in a lifetime as much about these tiny mysteries as a little honest attention will teach him about dirt, to be sure; still there is much to learn; much that may be learned and a little that must. Let us take this last—this necessity—first into consideration.

In planting seeds the inexperienced usually err on the side of thoroughness, burying them beneath a weight of earth that promptly smothers all their aspirations. There is a certain amount of energy stored in a seed—enough to reproduce the plant from which it came—but not enough to do more than this; not enough to move many times its own weight of earth aside in order to do its work. Hopelessly they give up the ghost and go the way of all dead things, instead of the way of the living—and the gardener grumbles, when he has only himself to blame.

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The earth-covering should never be deeper than five times, and usually not more than three times, a seed's greatest diameter, when planting out-of-doors. In frames or flats (shallow boxes) indoors a covering about equal to the seed's own diameter is sufficient, because in the latter situations the moisture and temperature can be artificially regulated. The greater depth out-of-doors is simply to insure against drying out and chilling the seeds where there is no means of governing these factors.

Whether you are going to plant indoors or out, water the soil where the seeds are to go thoroughly the day before putting them in. This will bring it to just the right degree of mellowness at the time of sowing.

Seeds go into the ground in drills—that is, in continuous rows—in hills or clusters, singly, and scattered like grass, according to the plant which they will produce. The packet in which each variety comes usually has printed upon it the method to be followed with the seed enclosed; so that part of it is easy, as these directions may be depended upon if the seeds come from a recognized first-class seedsman. It is a waste of time and money to purchase from any other, by the way.

If you have seeds to sow in drills, lay a board down upon the proposed bed or wherever the seeds are to go, for a "ruler"; draw a line along its edge with a pointed stake for a "pencil," dragging it deep into the soil or lightly along its surface according to the depth of drill the diameter of the seed demands; scatter the seeds into this little trough and brush the earth that was pushed

SEEDS AND SOWING

out of it, back over them. Then pat it lightly down with a float—a “flatiron” contrivance of wood, 6 x 9 inches or thereabouts and an inch or two thick, with a small piece nailed upon its upper side for a handle. It can be made of any old pieces of wood that happen to be available.

Seeds sown singly in rows should have the same long drills marked for them, the seeds themselves being dropped in at regular intervals instead of continuously. Hills are just shallow, saucer-shaped depressions into which the requisite number of seeds are dropped, separated so that they will not touch each other. The earth is drawn over them and as the seedlings shoot up, gaining in height, more earth is drawn up from the sides until the hill is formed which supports the little plants and deepens their roots.

Scattered or broadcast sowing is like the sifting of pepper from a shaker, and the earth over the seeds is sifted on in the same light fashion if any at all is used to cover them. Usually seeds that are scattered are simply firmed into the ground by pressing with the float, the idea being always to bring the grains of soil close against the seed on every side, keeping it evenly moist by capillary action and allowing no irregular spaces for air to intervene and shut off this moisture. Air is essential, to be sure, but not an excess of it on one side and none on the other.

The beginner is apt, however, to give an excess of water rather than of air. Many a garden has been drowned under a simple faith that it is being thor-

oughly watered. The amount of water a garden requires is just enough to maintain the soil at a condition of slowly crumbling apart in the hand after being squeezed—and this proportion should be *constantly* maintained. Too dry a soil or a soil that is too wet even, is not so bad as the alternations between the two extremes which careless gardening permits.

Seeds vary greatly in the time required for germination. Some sprout as soon as the earth closes around them, seemingly, while others lie dormant for so long that the novice at last gives up hope, growing so thoroughly resigned to his disappointment that he forgets them completely, when lo! up comes the living green one day, quite a year perhaps, from the planting time.

But happily such procrastination is found only among the slow growing plants, with which the beginner is seldom tempted to experiment—the perennials which furnish our trees and shrubs and hardiest vegetation generally. Flowers and vegetables ordinarily spring quickly into activity, in a very satisfactory and obliging manner, rewarding the beginner's labors usually within a fortnight—sometimes much sooner.

So much for the practical details of seed handling; and now for one or two things about seeds themselves that ought to be understood—and that are interesting to know.

A seed is the case in which, carefully folded and ingeniously packed away, lies an embryonic plant, with the food necessary to sustain it for a certain period of its life above ground. In some seeds this plant is



The necessary equipment for raising plants from seed consists of shallow boxes called flats, a sieve for sifting the soil and a watering can with a fine rose—not forgetting the chief essential, a light sandy loam



The man who has had a garden for two or three years will tell you that few things are so conducive to rapid and effective work as some sort of a tool house where everything may be kept in its place

SEEDS AND SOWING

developed enough for microscopic dissection to reveal it plainly, in others it is very rudimentary.

Usually it has two plump divisions called cotyledons—four syllables, *cot-y-le-dons*, with the accent on the first; there are, however, plants which have more or only one, but they will come later; the cotyledons, if they push their way up through the earth—some do not—spread apart and look to us like leaves. Consequently we usually speak of them as the first or seed leaves, although they aren't leaves at all. It is between them and protected by them that the actual growing point of the plant waits—the plumule or true leaf-bud whence the real plant is to arise, with the plant's true leaves.

The cotyledons are only caretakers—the nursemaids of the baby plant itself—which feed and guard it until it has grown big enough to draw its own sustenance, through its true leaves and the little roots that have been keeping pace underground with the leaves' growth, from the elements about. Until a true leaf is formed, every plant lives on the food stored away with it in the seed, no matter how microscopic that seed may be.

Not until the true leaves have developed, generally speaking, are seedlings strong enough to bear handling and transplanting. Some of your seed packets will tell you to transplant when the third leaf appears, or to thin out when the true leaves appear, which means of course the third leaf after the cotyledons in the first instance, the first pair of leaves in the second—for

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sometimes the true leaves appear in pairs, opposite on their stalk, while others come out singly, one on one side, the next on the other. Always follow such directions carefully and do not anticipate, nor wait beyond, the stipulated time.

Once you have watched a seedling—any seedling—through its rudimentary growth from funny, round or oval, sturdy little cotyledons to two or three true leaves and noted the marked difference in the appearance of the latter from the former, you will wonder why you never noticed it before—if you have not. Seed germination is one of the most interesting things in this very interesting world, though it is common—almost as common as the dirt,

VI

SEEDLINGS AND TRANSPLANTING

SEEDLINGS are little plants just from the seed, raised indoors or out, wherever convenient. Their removal to better places—the process of transplanting—is a part of gardening extremely important for the garden beginner to understand, inasmuch as he may often make almost his entire garden this way, in the first season, buying seedlings from a florist if he has been late in making a start with garden operations.

The soil into which seedlings are to be moved from their seed bed should be in about the same condition, as regards moisture, as the soil in which seeds are sown—that is, as moist as a previous day's watering will make it. And the soil from which they are taken will, of course, be about the same, and will yield their roots readily, without tearing.

At this stage of operations comes in the *dibble*—a most useful affair which, thrust an inch or so into the earth half an inch from the seedling, is twisted and worked and tilted this way and that gently until the soil is loosened enough to let the little plant be picked lightly from it. For very tiny plantlets a toothpick

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makes as good a dibble as may be had, but there are occasions when a section of broom handle, sharpened like a long pointed pencil, is not a bit too big. A little practice with the tool will quickly teach you the size appropriate for any particular plant.

Lift the seedling by taking one of its leaves carefully between the soft ball of the thumb and index finger—you will be surprised at the ease with which you will handle mere atoms of plants this way—not touching the body of the plant at all, nor allowing its roots to come in contact with anything. Thrust the dibble into the earth at the spot the plant is to occupy, making a hole as deep or a little deeper than its longest root; lower the seedling into this hole until it is as deep as it originally grew, then thrust the dibble down once more, half an inch from it this time, and by tilting the handle over towards it gently press earth against and around its roots. If the hole seems insufficiently filled after this, leaving the plant unsteady and loosely set, thrust the dibble down at another spot, or lay its point flat onto the soil alongside the plant's stem and press down until the earth falls into place, filling the hole completely. Do not pack the dirt, but make it firm and water moderately.

Bear in mind that the plant which is frequently transplanted endures the operation with much more grace than one which is left long in one place. Frequent transplanting tends to the development of a more compact root system which will be made up of many fine and hair-like short feeding roots instead

SEEDLINGS AND TRANSPLANTING

of the long, tenacious growth which the undisturbed plant is able to put forth—and naturally the former are less liable to injury and breakage when lifted than the latter.

There are probably no plants which cannot be transplanted by a skilled operator, but there are many which certainly will not tolerate the treatment of any but an expert—and some that even the expert shrinks from handling. Usually these are species or varieties which send straight down, deep into the earth, a long, trunk-like root which is called a tap-root. This simply will not yield to removal without breakage.

Whenever the instructions on a seed packet direct that the seed be sown where it is wanted in the garden, and say nothing about transplanting, it is very likely that the plant is one of those which puts forth such a root—and the direction should be literally followed, else there will be failure.

Good-sized, growing plants with a mass of roots large enough to need some earth removed to make room to set them, may be firmed into place by filling with water, gently poured, a depression left around their crown. After this has settled, the rest of the earth is thrown into place—and thus the whole operation is accomplished with comparatively no violence or shock to even the tenderest rootlets.

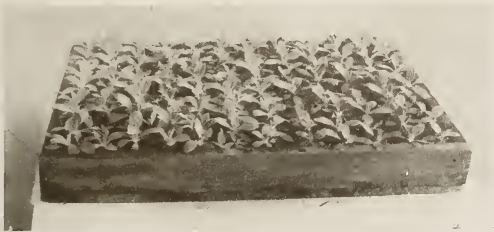
VII

PLANTS AND CULTIVATION

WHEN plants have reached maturity or approach it, whether flower, fruit or vegetable, watch them closely and do not withdraw constant care from them. Volumes written about them could not cover, comprehensively, all their little queernesses and strange freaks. Each one seems almost a problem by itself, sprung up from the ground to show some new phase of Mother Nature's ingenuity, and each gardener must learn by his own experience how to meet the particular emergencies arising from the combination of soil, weather and plant with which he has to deal.

But while maturing plants differ in their requirements greatly and each must be studied by itself, there is one thing that is appreciated by all alike, and that is tillage. The man with the hoe, *and* the rake, *and* the cultivator, is the being they hail as friend, be sure of that. Indeed this stirring of the soil is so great a benefit that one of the most ancient garden maxims says "tillage is manure."

It is not alone to keep the weeds down, however, that this stirring of the surface must be kept up, surprising as it may seem and contrary to popular



A flat of seedlings in the proper condition for transplanting. They should not be handled until they have developed true leaves



If you sow seeds indoors in flats you will be able to give them the regular attention they require and, incidentally, you will not miss the keen enjoyment of seeing them come up through the soil and develop



If a flat of seedlings ready to transplant is watered the day before they are to be moved the soil will be in the best condition for this work. The soil in the flats or pots to which the seedlings are moved should be in the same condition as regards moisture

PLANTS AND CULTIVATION

notions. Incidentally it does prevent them from gaining a foothold of course, but its great merit lies in its action on the soil itself.

Moisture is carried through soil by capillary attraction. When rain or dew falls on the ground it penetrates to plant roots by means of this action, going down and down until it is equalized in the soil or finds a way through into still deeper fissures and drains out into rivers or springs.

With the coming of fair weather after a rain, however, this downward action is immediately reversed on the surface, where the water particles first yield themselves to the air and heat of the sun and pass from the ground completely. Gradually the pull upward of this same capillary force draws the fluid from deeper down until all that the thirsty earth has absorbed is relentlessly taken from it and scattered in the air again as vapor.

But tillage is the interrupter of this robbery of the sun. It interposes a little, thin blanket of soil particles which are too widely separated from each other for capillary pull to be efficacious, and the soil beneath it is thus enabled to retain the precious drops for a much longer period, even in decided drought.

Then, too, this finely pulverized, blanketing soil absorbs moisture more readily than a hard-baked, unstirred surface, and even the light precipitation of dew, night after night, is greedily drunk by it.

So the importance of tilling rests not in its merit as a weed eradicator, you see. But happily it does

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eradicate them thoroughly—for weeds are gluttons and by virtue of this spirit in them are able to take the best of everything from a piece of ground, starving out its rightful tenants.

Go over a garden—or a bed, or whatever you are tending—at least twice a week with this gentle surface “scratching.” That is all that it need amount to, really; the stirring need not be deep—an inch of loose soil is enough—but it must be frequent, and only heavy rain should be allowed to interfere with the semi-weekly repetition of it.

For small surfaces one of the small hand weeders is excellent. For larger spaces a hand cultivator, made purposely for tilling and used like a hoe, is better. There is, too, a wheel-hoe, which is excellent in garden rows, though it is not adapted to every sort of location as the hand cultivator is.

Deeper stirring of the ground has more marked physical effects on the soil, hastening chemical activities and making the stores of plant food available. Very often soil contains all the elements necessary to support plant life richly, but not in such form that the plants can consume them. Therefore they go hungry in the midst of plenty, even as a man might in the midst of quantities of those elements which science has found out compose man—if they were not present in forms available to his teeth, appetite and digestive apparatus.

Remember always, however, that deep tillage is not a conserver of moisture. On the contrary it lightens

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stiff and heavy soils by draining them. Thus they become "deeper," warmer, finer and consequently more easily penetrated by the tiny hairlike rootlets that are the actual feeders.

Plants growing as specimens—that is shrubs or flowers set by themselves and not in a bed or border—need this same treatment and respond to it with gratitude almost as marked as the humbler garden stuff shows. Even trees appreciate the loosening of the earth around their trunks. Indoor pot plants, too, should be included. In fact one should cultivate the habit of disturbing the surface soil around practically everything that grows, for tillage is a requisite first, last, and all the time, to which everything else is secondary.

VIII

PRUNING

SOUND knowledge of a plant's manner of growth should precede any attempt to direct that growth by pruning or otherwise training it, just as sound knowledge of anatomy must precede the successful surgeon's work on the human subject. The intelligent direction of the tiny plant's development which such knowledge makes possible, will make pruning unnecessary when the esedling has matured into a tree—and this is a consummation devoutly to be wished.

We are accustomed to think and speak of buds as embryonic flowers, but they are a great deal more than that. There are flower buds, leaf buds, and mixed buds—that is, flower-and-leaf buds—and every branch and limb of the sturdiest tree, and even the tree itself, has had its beginning in a bud. They are the source of all growth after a plant is out of the seed. Indeed the little plant springs from the seed, broadly speaking, by means of its *terminal* bud. Each year its growth proceeds upward by the formation, during the summer, of another terminal bud which crowns the season's work, and opens into leaves, possibly flowers, and a further growth of stem the succeeding year.

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On either side of this main stem at regular intervals, lateral buds are formed, from which, in due season, branches develop. As these commonly rise between the leaf stalks and the main stems—that is, in the axils to the leaves—they are called *axillary* buds. They are, however, the terminal buds of those branches which ultimately spring from them; so growth is actually *always* carried on by a terminal bud.

This leaves a lot of apparently useless buds along every stem under each leaf stalk, for a very small percentage of these develop and grow into shoots; and of those that do, many die quickly, choked out in one way or another—else there would be as many branches in any given season as there were leaves the season before. But these seemingly useless buds are Nature's wonderful reserve, held back for weeks or months or perhaps years, as the case may be, yet always in readiness to spring to the rescue when the plant's normal leaf surface is taken away, either by accident or design.

For this leaf surface cannot be reduced; the leaves, which spread to the light and air certain substances which the roots have taken from the ground, are as necessary to the plant's life as its roots, and the proportion of leaf surface to root surface must be maintained. With wonderful intelligence and patience therefore they wait, these reserve buds, until injury comes to the terminal bud; then they fairly leap into activity in their haste to supply the loss. The strongest gain the lead and keep it usually, and thus, the original stem having ceased its growth, those branches which spring from the

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strongest buds become, in their turn, leaders. Sometimes there are several of these, sometimes only one.

There is a third kind of bud which some trees and shrubs produce in great abundance, following injury. These, rising from anywhere on old branches or out of the trunk itself, are called *adventitious* buds. They simply supplement the work of the dormant axillary buds, and hasten foliage renewal when large limbs have been sacrificed and there has consequently been great loss.

Generally speaking the most virile strength of any branch is nearest its tip. Growth proceeds at the apex, with branching growths usually springing from the axillary buds nearest the apex—the upper buds these are called. Removing the terminal bud stimulates the growth of these upper axillary buds—or the branches which these have formed—because the supply of nourishment to that particular stem has then to be divided between only two buds, while before it supplied three. It is seldom, however, that the removal of the terminal bud alone will induce branching further down a stem—otherwise that form of growth characterized as bushy—though it may sometimes.

The severe cutting back of privet in hedges is an excellent example of what must be done to secure dense branching low down on a plant; and it is also an excellent example of what will happen to a plant that is pruned to excess. Privet branches are opposite each other always, and two will appear immediately below where a stalk is cut, while a third, lower down, will very

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often develop, or even another pair. To secure these branches near the ground it is therefore necessary to cut it first to within a few inches of the ground, and then to cut down the shoots which come in consequence of this cut, close to the parent stem, and so on. This forces the growth of stiff, stocky plants—just what one does not want in flowering shrubs, though it is highly desirable in a hedge.

Removing the first pair of axillary buds below the terminal bud will start the next lower pair into growth usually, while the removal of buds or small branches all down along a stem will stimulate the growth at its apex. In this way a plant's general growth may be directed towards a certain ideal form from its infancy, with never a bit of waste in its vitality or in the time required to arrive at the ideal.

Never be in a hurry to prune branches from anything, either old or new, until much experience has been your teacher; but when spring warmth awakens sleeping buds and they bestir themselves and come forth, if their intentions do not seem to be in accord with the plant's best form and its best interest, wipe them gently out of existence with a gloved thumb—if the naked thumb is too tender. Nowhere is the struggle for existence keener and fiercer than in the vegetable kingdom. Always aim to reduce this struggle as much as possible, as early as possible—to nip it in the bud, literally.

This is the chief reason for pruning, ordinarily; the principle of it is always to relieve the plant by

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reducing this struggle. For, of course, when its best efforts are constantly strained to the utmost in just keeping alive, it cannot produce flowers nor fruits in abundance, nor of a very high quality. When there are too many branches, or many that are old and weak, none can be as strong and leafy as they should, for all are insufficiently nourished; it is a desperate struggle for life between them constantly.

A little pruning every year is the ideal. The destruction of an ambitious shoot as soon as it starts—the destruction of it as a bud—is far easier on the tree, and the gardener too, than the laborious task of sawing through a good sized limb after it has been allowed several years in which to grow.

But when large limbs must be cut away, the loss to the tree is far less and the operation is less likely to be disastrous if the work is properly done. The right way is simple enough, but everywhere wrong ways are in evidence, and for one person who understands such pruning it seems there must be a score who do not.

All large limbs should be cut as close to the main trunk from which they rise as it is possible to lay a saw, and the cut which severs them must always be *parallel with* the main trunk and *not at right angles* to the branch which is being taken away. *No way but this is right*, no matter who practices it!

In the case of large and heavy limbs—which ought never to be cut down unless there is an absolutely imperative reason—it is best to remove the limb first



One of the chief reasons for pruning is to induce lower growth. This is well shown in the privet hedge, which must be cut back nearly to the ground and gradually allowed to attain height with a bushy growth

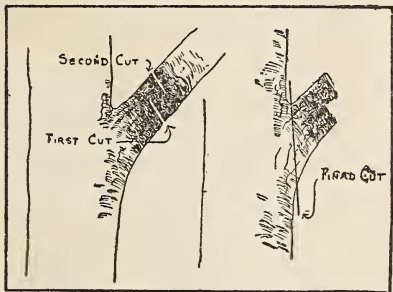


A branch of privet, showing how the cutting of a stalk induces the growth of two branches opposite each other below the cut

PRUNING

with two preliminary cuts, as shown in the diagram, trimming the stub down to the proper level of the trunk afterwards. The first of these two cuts is made from the under side of the limb up, and about five or six inches away from the trunk from which the limb rises; this cut should extend a little more than halfway through the limb. Then, half an inch nearer the tree trunk, the second cut is made, from the upper side of the limb down. The branch will fall to the ground without splintering or tearing in the least as this cut is completed.

Then the saw is laid flat against the main trunk as before directed, and the stub taken off. This levels the surface and prepares for the healing process which Nature immediately takes up.

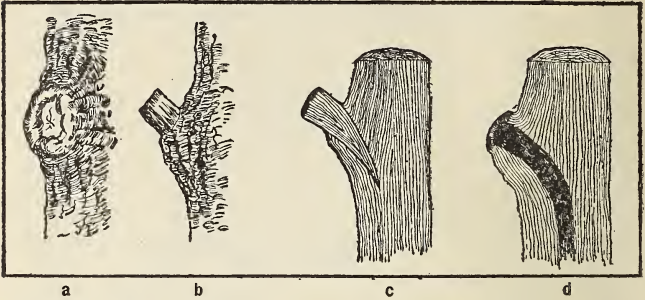


The Right Way to Cut off a Heavy Branch.

Never leave any stub extending out from the trunk or the trunk branch, for the bark of the tree cannot draw together over such a stub, and the stub is bound therefore to die, then to rot away, and then to carry decay straight down into the heart of the tree. The drawing illustrates this.

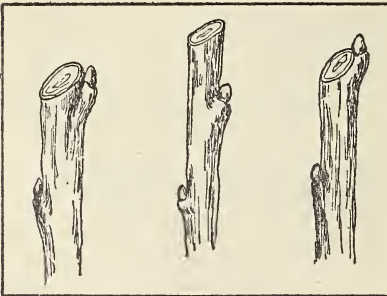
Shoots and small branches should be removed just

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a—Right way; b—Wrong way, showing a stub that bark cannot cover; c—Section showing rise of branch; d—Channel of decay to heart of tree along branch.

above a bud, as near to it as possible and yet far enough away to avoid injuring it. In plants on which the buds alternate, an outward setting bud should



Pruning Twigs.

The Right
Way.

Too Long
above Bud

Too Close
to Bud.

be the one left at the top of a pruned branch. This assures an outward growing new shoot and an open center, which is the ideal form to promote healthy and luxuriant growth.

There are two things regarding

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the form which growth takes that should be remembered when pruning. One, applying to trees especially, is that leading branches must never be allowed to spring from the same point on the trunk—or from opposite the same point is perhaps a clearer way to put it—while the other, applicable to every sort of plant, is that, generally speaking, the outer shoots or branches should be left and the inner ones cut away.

In the first instance the tree is weakened structurally and will split more readily under stress of wind or ice—or fruit—when its branches diverge at just the same level, forming a sharp crotch or Y; in the second, a plant becomes choked and top-heavy if inner growth is constantly encouraged, and the branches suffer injury from rubbing against each other.

Next in importance to these, to be equally carefully remembered, is the fact that every tree or shrub or vine has its own little personal peculiarity about flowers and the manner of producing them—and produces them *only* on wood of a certain age—sometimes one year old, sometimes two, sometimes still more. So it is always necessary to know the peculiarity of any plant in question in this respect, before venturing to lop off a branch, else an entire season's product may be destroyed.

Of fruit trees, the apple and pear bear on "spurs" of old wood that may be anywhere along the branches, but peaches are always borne on wood of the previous season's growth. Trimming off the annual shoots will therefore sacrifice the fruit of the latter but not of the former, while "heading in"—that is removing the ends

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of the branches with their growing terminal buds,—being a process that encourages the growth of lateral buds (that are waiting for just this to happen) into shoots or young branches, of course increases the amount of new, therefore of fruit-producing, wood.

Among flowering shrubs the lilac and hydrangea afford much the same contrast as the apple and peach among fruit trees. Hydrangeas bloom on wood of the season's growth, lilac on wood of the previous season. The former may therefore be pruned very early in the spring without danger of destroying the blossoms, but the latter should only be gone over with the knife immediately after flowering. This gives the plants a chance to grow branches for the next season and to stow them with flower buds before frost interferes.

Always keep in mind that pruning at the ends of branches stimulates excessive growth of shoots, up to a certain point—of course it is possible to overdo the matter and kill a plant altogether by never giving it an opportunity to recover from its many wounds—and that the way to thin shrubs therefore, is to look beyond the branches that are too numerous down to the stalk whence they spring, and cut them off at their very beginnings or cut out the stalk at the ground. Otherwise they will produce shoots themselves, and double the number that is choking the bush, instead of reducing it.

But the final word is always "restraint." Dead wood and weak wood should be cut from shrubs, superfluous branches which crowd a tree should be taken



An example of both good and bad pruning. Branches have been cut off close to the trunk as they should be, but so many have been taken near one point that the tree as a fruit tree is headed too high



A splendid specimen of hydrangea which by judicious pruning has been developed into a fairly large tree

PRUNING

away—but only a little should ever need doing at any one time or season. And only a little will need to be done at one time, if that little is attended to as each year brings it.

It is not of course possible to give here a complete list of trees and shrubs, with their peculiarities in regard to bloom, but some of the most commonly planted are included below, with directions as to time for pruning.

FRUITS

Apple. Fruit borne on old spurs—prune in spring, or after the fruit is gathered.

Pear. Fruit borne on old spurs—prune sparingly in spring, or after the fruit is gathered.

Plum. Fruit mostly on spurs, but in some varieties on both spurs and annual growth—prune in spring.

Cherry. Similar to plum—prune in spring or after harvest.

Peach. Fruit borne near base of previous year's shoots—prune after harvest.

Blackberry. Fruit borne on canes of previous season's growth—cut old canes out after fruiting, cut young canes back as soon as two feet high—cut laterals on these sparingly at tip in spring, or not at all.

Raspberry. Same as blackberry; spring pruning is only to thin the fruit; all cutting back should be done the previous season.

Currant. Fruit borne on both old and young wood—the best on base of 1 year shoots springing from 1 year spurs; have no wood over three years old.

Grapes. Borne on wood of present season *which*

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rises from wood of previous season; fall or winter pruning is best.

FLOWERING SHRUBS

Roses. Flowers borne on new wood—prune out old wood and weak shoots after flowering—or cut back before life shows in spring from $\frac{1}{2}$ to $\frac{3}{4}$ of bush.

Forsythia. Flowers borne on old wood—prune immediately after flowering.

Hibiscus. On the season's shoots—prune fall or early spring.

Honeysuckle. See *Lonicera*.

Hydrangea. Borne on the season's shoots—prune fall or early spring.

Lilac. See *Syringa*.

Lonicera. Usually on season's shoots—safest to prune immediately after flowering however, as some varieties bloom very early.

Philadelphus. (Commonly called *Syringa*.) Borne on old wood—prune immediately after flowering.

Spiræa. (Shrubby varieties.) On old wood—prune sparingly after flowering.

Syringa. On last year's wood—prune immediately after flowering.

Viburnum. On old wood—prune after flowering.

Weigela. On old wood—prune after flowering.

Clematis. On season's shoots—cut down in winter or early spring.

Evergreen hedges. Prune in June, trimming just enough to keep the chosen form.

IX

GARDEN PESTS

THE gardener's hereditary enemies are of two sorts: the insects, which feed upon leaf and flower, fruit and plant juices; and the fungi. The former work in the open, as it were, and are not therefore quite so difficult to deal with as the latter, though they are provokingly persistent. The fungi are subtle and more insidious, the spores which produce them being invisible and therefore able to establish themselves in spite of the greatest watchfulness directed against them. With these, prevention is the only "cure"; once a plant falls a victim to the disease which they produce, it is usually fatally stricken. Hence they are more to be dreaded than insects, in a way, and fungicides should be constantly used.

It is absolutely useless to undertake the battle against insect hordes without first knowing definitely what kind of an army it is that has invaded. For insects that live upon plants are divided into two great classes, according to their method of feeding; the mandibulate or biting insects, and the haustellate or sucking insects. A campaign to rout them *must positively*

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be laid out according to their position under this classification.

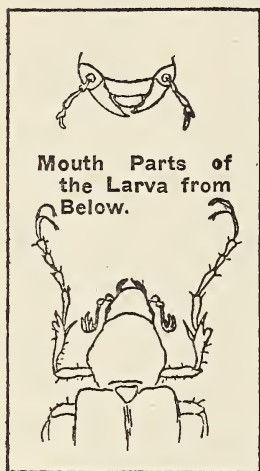
The essential thing to be learned therefore about any small depredator, right at the start, is whether he is chewing pieces out of the plant which he has chosen and actually consuming its solid substance, or whether he is extracting its juices. This is not difficult to find

out. The biting creatures have big, strong mandibles which are plainly visible if the insect is watched quietly for a few minutes; and of course these fellows leave telltale holes behind them where they have helped themselves in dining.

Many beetles, all true locusts, weevils, grasshoppers, slugs and most larval forms—the latter being what we commonly designate as worms, grubs or maggots—are in this class. These may all be destroyed therefore by what are called direct poisons—that is, poisons applied to the plant,

hence swallowed by the insect.

All the arsenicals or compounds of arsenic are direct poisons—decidedly. They must be very carefully handled because they are so direct—such deadly poison.



True Beetle. Chewing
or Mandibulate.
Head of Rose
Chafer.

GARDEN PESTS



Head of Clover-
leaf Weevil.

But they are applied to the plants in such dilute forms that no danger attends their use, after they are on. It is before they are used that they are dangerous, the danger lying in not taking every precaution with them in the concentrated state. Be sure that they are labelled conspicuously "poison" and that they are put and kept carefully out of the reach of little

folks and careless folks.

The Department of Agriculture assures us that the poison disappears almost completely from the plants in from 20 to 25 days, and that even if it did not, it would be impossible to consume enough of the fruit or vegetable to get a really poisonous dose. Even if an entire apple, core and all, were eaten,

it would be necessary to devour several

barrels of the fruit at a single sitting, to make the poison effective. Nevertheless if one is nervous about the chance of consuming any poison at all, it is better



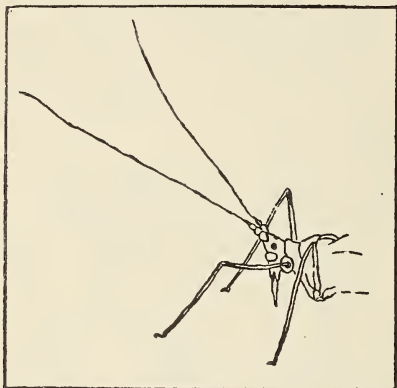
Head of larva,
Clover-leaf
Weevil.



Jaws of larva,
Clover-leaf
Weevil.

to use something else on plants that are soon to be eaten.

The powder made from the roots of white hellebore is the best substitute for an arsenical insecticide. It poisons insects in the same way that the arsenicals do but is less dangerous to man, although it is distinctly poisonous and will cause death if enough of it is taken.



Sucking or Haustellate. Head of
Aphid—a Green Pea Louse.

In some instances poisonous gases or fumes are preferable to any direct application, but these are special cases.

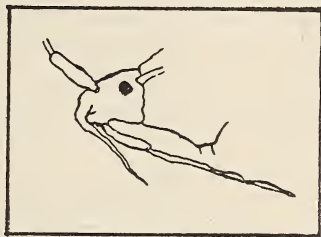
The haustellate insects are provided with a haustellum or proboscis—a sucking beak—which they thrust down into the soft inner tissues of a plant,

whence they extract the juice. All of the true bugs belong in this class, all of the scale insects, and the plant lice or aphids. The injury which they do is not so immediately noticeable as that done by the mandibulates, but it is quite as serious. Indeed, because it is not so apparent it may very easily be much more serious, because undiscovered for a time.

GARDEN PESTS

This class are less easily handled too than the greedy, chewing, devouring kind, because poisons on the plant do not affect them in the least. The only sure death to them is contact poison—which means that *every insect* must actually be located and treated. Poisonous fumes are available sometimes, but ordinarily a spray is the accepted method of dealing with them—a spray applied so thoroughly that every twig and leaf and branch is reached, on every side. Halfway measures are time wasted.

Not all of the insects that must be dealt with are obliging enough to live in the open, or above ground. Root maggots, root lice and grubs work underground, hence are classified as subterranean; borers keep within the bark or wood of a plant or in its stem, gall insects conceal themselves within the galls which their presence has caused, and leaf miners “mine” the leaves. All of these are termed internal feeders; and the destruction of both these classes of concealed insects requires special methods, although they do of course belong to one or the other of the two great divisions first explained. Borers are mandibulate, also grubs and “miners;” some form of louse is generally responsible for the forma-



The True Bug. Head of
Squash Bug. Haustellate
Class.

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tion of galls, and lice always belong to the haustellate class; but whichever the class, they must be suffocated usually when they are subterranean or internal feeders.

Spraying, or what the experts call the wet method of applying insecticides, is not a difficult undertaking but it demands suitable apparatus. It is the one way of making applications thorough. The dry method—application of poison in powder form—is useful in the case of low growing plants sometimes, but is advisable only when they are not to be used for food in the near future. A third method of destruction is the use of poisoned bait; this is used for cutworms and similar insects that advance along the ground, like the grasshopper or locust.

The size of a place and the consequent amount of work to be done will of course determine the kind of apparatus to be provided. There are many kinds of small hand sprayers, as good a one as any being a small brass or tin affair called an atomizer spray syringe. This has a tank holding a quart of fluid; for use around a small garden it is very satisfactory because it may be turned in any position without spilling its contents. Thus leaves may be reached from underneath as readily as from above.

A bucket pump is of course better where there are many shrubs or bushes; the ideal, suitable for everything, is a spray outfit on wheels that may be moved to any part of the grounds easily. And then there is a knapsack spray which may be carried on the shoulders of the operator; this is very much liked by some.

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Many insecticides require to be constantly agitated to keep the mixture in proper condition, and the best pumps are therefore equipped with an arrangement for doing this, called an agitator. Some solutions require special nozzles; these are indicated in the list.

Powders are applied more evenly perhaps with a powder gun or bellows, but a powder duster, which is really nothing but a tin pail with a cover, perforated all over the bottom like a huge saltshaker, is usually perfectly satisfactory. A bag of coarse and open cloth, like scrim, is also practical, though this does not insure sprinkling the powder only *down* upon the plant, as the tin shaker does.

The time of applying insecticides is of the greatest importance, neglect of even two or three days being sufficient to make all the work futile sometimes. Remember always that it has been planned with the greatest care and after years of scientific investigation and patient study, to meet certain periods in the life cycle of the insect in question, which may be vulnerable *only* at such period. Too soon or too late, either one therefore, will not do. Do the work *just* at the time specified, when it is actually specified. If the directions say "when the petals fall," that is the time; if they say "four days after the petals have fallen," *that* is the time.

Consult the Spraying Table when you wish to know what to do with a certain kind of tree; consult the Spraying Calendar for the work of each month.

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INSECTICIDES

DIRECT POISONS FOR CHEWING OR BITING INSECTS

1. Arsenite of Copper, Green Arsenoid or Green Arsenite

- (a) Strong Mixture: 1 ounce to 6 gallons of water. Use this only on very strong and hardy vegetation such as potato plants, or for insects very hard to kill, such as the cankerworm.
- (b) Medium Mixture: 1 ounce to 9 gallons of water. Use this for all general spraying; do not use on extremely delicate and tender plants.
- (c) Dilute Mixture: 1 ounce to 15 gallons of water. Use this on peach, apricot, tender plums and all tender vegetation.

Mix the poison into a thin paste and add twice as much quicklime as poison—more will do no harm, even up to three times as much. The lime takes up the “free arsenic” which is the substance that scalds the plants. After mixing, strain into the spray tank, rinsing and pulverizing all of the solid matter through the strainer thoroughly; then add the necessary amount of water. This is advised instead of Paris Green.

GARDEN PESTS

2. Arsenate of Lead

(known in the trade as *Disparene*).

Formula: 3 ounces of crystallized Arsenate of Soda.

7 ounces of crystallized Acetate of Lead.

10 gallons of water.

Dissolve the crystals, each kind separately, in a small amount of water—the lead will dissolve more readily if the water is warmed—unite them, and reduce by adding the remainder of the water. A milky mixture will result; straining is not necessary if the poison is thoroughly dissolved and thoroughly stirred with the water.

A prepared paste or dust of this combination may be purchased but it is better to mix as needed. Keep always the proportion of 1 ounce of poison to 1 gallon of water. It may be used stronger without harming the plants, but this is a safe general strength, effective and not risky.

Arsenate of Lead remains suspended in water better than any other poison, is less likely to burn foliage, and sticks to all that the spray reaches. The filmy coating which it deposits shows consequently just what has been sprayed. Of all the arsenicals it is the safest for tender foliage; and it may be combined with Bordeaux Mixture, using

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the latter in place of the water, and making one spraying do the work of two, when the Bordeaux is required.

3. Hellebore

(non-poisonous to man).

Use 1 ounce to 1 gallon of water, as a spray. For use dry, mix 1 part with 5 to 10 parts of flour and let stand in a closely covered vessel for twenty-four hours before using. At the end of that time the flour will be as efficacious a poison as the pure hellebore. Sprinkle on leaves, on under sides as well as upper, while the dew is still on the plants or after wetting by rain or a watering pot.

CONTACT POISONS FOR SUCKING INSECTS

4. Kerosene Emulsion

Soap Formula: $\frac{1}{2}$ pound of hard soap (1 quart of soft).

2 gallons of kerosene.

1 gallon of rain water ("break"
hard water with lye).

Dissolve the soap in the water by boiling. Take from the fire and add to the kerosene immediately, while boiling hot, churning the mixture violently by pumping it back upon itself through an open nozzle throwing a

GARDEN PESTS

strong stream. Five minutes or less of this violent churning will bring it to the emulsion stage, when it will have increased in bulk one-third to one-half and be as thick as rich cream. This will keep indefinitely as stock.

Milk Formula: 2 gallons of kerosene.
1 gallon of sour milk.

Unite these without heating, and churn with pump. Three to five minutes are necessary to make the emulsion, the change coming very suddenly when it does come. The mixture becomes much thicker than the soap emulsion. It should be prepared only as needed, for it will not keep unless sealed in airtight jars.

Winter Spray

- (a) Dilute 1 part of stock with 5 parts of water for use on apple and pear trees.
- (b) Dilute 1 part of stock with 7 parts of water for use on peach and plum trees.
- (c) Dilute 1 part of stock with 8 parts of water for use on apricot trees.

Summer Spray

- (d) Dilute 1 part of stock with 10 parts of water for apple and pear trees.

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- (e) Dilute 1 part of stock with 15 parts of water for use on plum, peach, apricot and other tender foliage.

The emulsion may be used undiluted in winter, to destroy scale on trunks and large branches of trees that are badly infested. It cannot be sprayed however, but must be applied with a brush or sponge and this should only be done when a tree is in a very bad state.

Never use the emulsion any stronger than directed, for it is extremely dangerous to a tree unless handled with caution. Always follow the table as to time of using it also. The weakest solution is quite strong enough for any plant infested with plant lice; such soft-bodied insects succumb easily anyway. It is simply a matter of reaching them all.

5. Lime, Sulphur and Salt Wash

Formula: 3 pounds of unslaked lime.
2 pounds of sulphur (flowers).
1½ pounds of salt.
3 gallons of water.

Slake the lime in a small quantity of the water; mix the sulphur into a stiff paste and add at once to the slaking lime; add the salt to the water, then the lime and sulphur

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and boil all together, in an iron vessel, for from two to three hours. Dilute after boiling until the total amount of mixture measures 6 gallons, and apply at once, while hot. This is a valuable fungicide as well as an insecticide.

It should be strained into the spray tank through an iron screen or strainer, and should be agitated continually while being used. It must never be applied to plants when they are in leaf; it is a *winter spray only*, to be used on dormant vegetation.

6. Soap Wash

Formula: 2 pounds of whale oil soap (get a *potash* soap).

1 gallon of water.

Dissolve the soap in the water by heating and apply the spray hot, undiluted, in spring before growth starts, for scale insects. Dilute 1 part with 5 parts of water for summer use against plant lice.

Common laundry or Ivory soap, either one, will make an effective summer wash for soft-bodied aphids, $\frac{1}{4}$ of a cake to 4 gallons of hot water being a good proportion. Use hot.

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FUNGICIDES

7. Bordeaux Mixture

This is made by combining a solution of Copper Sulphate with Milk of Lime and reducing the mixture with the proper amount of water.

Copper Sulphate Stock: dissolve copper sulphate (blue vitriol) in hot water, using 1 pound of the bluestone to 1 gallon of water.

Milk of Lime: Slake the lime slowly and add water enough to make a thick paste. Use wooden or porcelain vessels for both of these stock preparations and keep both covered to exclude the air. They may be kept any length of time.

(a) For dormant vegetation compound the mixture in this proportion:

1 pound copper sulphate (1 gallon of stock).

1 pound lime (dry weight before slaking).

9 gallons of water.

(b) For plants in leaf compound as follows:

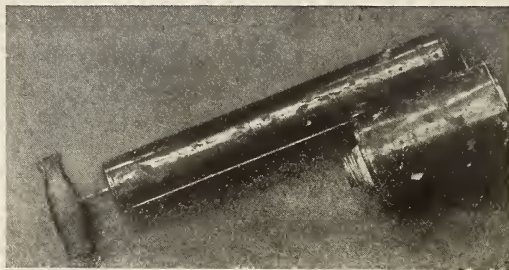
1 pound copper sulphate (1 gallon of stock).

1½ pounds of lime (dry weight before slaking).

13 gallons of water.



An encouraging fact in connection with the accompanying long list of insecticides is that a garden that is well tilled and well fed develops plants that will resist most pests of their own accord



If you have only a few small house plants your spraying might be done with a hand atomizer. For real garden work, however, it will pay to get one of the larger brass instruments and also a powder gun

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(c) For delicate plants compound a still more diluted form as follows:

1 pound copper sulphate (1 gallon of stock).

2 pounds lime (dry weight before slaking).

17 gallons of water.

Bordeaux Mixture loses strength after compounding and should not therefore be mixed until it is to be used.

For saving in labor and time it is nearly always well to combine this with Arsenate of Lead. They are each equally effective when used together.

Bordeaux, being a fungicide, must be used as already explained *before* a diseased condition is manifest. It is a preventive and as such should be universally used.

8. Potassium Sulphide

Formula: 3 pounds of potash:

3½ pounds of sulphur (finely ground).

3 ounces of salt.

1 gallon of water.

Mix the potash, sulphur and salt together in a metal vessel with part of the water. The chemical action will make the mixture boil. Add the remainder of the water,

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which gives a stock. Dilute 1 part of this with 100 parts water for use.

For immediate use, $\frac{1}{2}$ ounce potassium sulphide (Liver of Sulphur from the druggist) may be mixed with 1 gallon of water, but this loses strength by standing and is therefore suitable only for prompt application, as mixed.

FOR SUBTERRANEAN INSECTS AND INTERNAL FEEDERS

9. Carbon Bisulphide, or Bisulphide of Carbon.

(*Caution.* Never approach near the light or fire.)

For Borers in Woody Stems: Inject a few drops of the liquid into the hole and plug the latter with mud, wax or putty.

For Root Insects: Make holes in the soil as deep as the deepest traces of the insect. Pour two tablespoonfuls of the liquid into each hole and close at once by tramping the earth over. Sandy soil requires three holes to the square yard; heavy soil, four.

10. Carbolic Emulsion

Formula: 1 pound of hard soap (2 quarts of soft).
1 pint of crude carbolic acid.
1 gallon of water.

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Dissolve the soap by boiling in the water; add the acid and churn to an emulsion. Reduce 1 pint of this stock with 15 quarts of water for use at roots of tender plants. Reduce 1 pint of stock with 8 quarts of water for cabbage and all hardy plants.

Poison bait

For cutworms, wireworms, grasshoppers, locusts and all those insects which travel along the ground.

Dip small bunches of fresh green succulent vegetation, such as clover, in number 1a, and place them about where the insects are or are expected. Lay a board or stones over the bait to keep it from drying out and renew every three to five days. Slices of potato or apple may be used instead of clover.

A bran mash composed of 1 pound of white arsenic, 2 pounds of brown sugar and 8 pounds of bran, mixed thoroughly together and then moistened with enough water to make it wet but not sloppy, is very effectively used against cutworms and wireworms. Put it at evening in rows of corn or wherever they are numerous, but do not let it come next to the plants as it will burn them. A teaspoonful at the base of a plant in the small garden is sufficient, just far enough from the stem or leaves to assure its not touching them.

The Vermorel nozzle is recommended for general use. For spraying with number 5 it is advisable to use

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a separate nozzle, as the mixture is hard on the machine. This wash has not been advised in the Spraying Table for the reason that number 4 is regarded as generally more effective against the San José scale, in the east. Wherever the spray to be used is directed against scale insects however, number 5 may be substituted for number 4, if it is for any reason preferred, *on dormant vegetation only*, however.

A fruit tree of average size, such as an apple, will require from 3 to 7 gallons of any spray to wet it thoroughly. The object in spraying is to coat every leaf, twig and branch—every part of the plant—with the liquid. As soon as this is done, stop. Never attempt to do the work with an ordinary hose nozzle, for a fine misty spray is essential, and this of course cannot be produced by anything but a special nozzle.

Spraying Table

WINTER

VEGETATION DORMANT

PLANT	SPRAY	INSECT	TIME	REMARKS
Apple	4A	Scale	February 1.	Scrape loose bark lightly from limbs before spraying: this is to expose the hibernating adult psylla. Keep this wash away from roots by a mound of earth about plant. Draw this away from the plant when the operation is over and scatter to dry out. Spray on bright days only.
Pear	4A	Scale, Psylla	February 1.	
Cherry	4A	Scale	February 1.	
Plum	4B	Scale	February 1.	
Peach	4B	Scale	February 1.	
Apricot	4C	Scale	February 1.	
Small fruits	4B	Scale	February 1.	
Shade trees	4B	Scale	February 1.	
Shrubs	4B	Scale	February 1.	

SUMMER

VEGETATION ACTIVE

Apple (seven sprayings)	4D	Scale	March-April.	Mix 7B and 1B and use as one spray. Never destroy bees by spraying fruit trees in full bloom. Watch for holes of entry. Mix 7B and 2. For second brood.
	7B 1B	Scab Codling moth	Soon as leaves are unfolded.	
	7B 1B or 2	Scab Codling moth Curculio	Three days after petals fall.	
	2	Codling moth Curculio	As larvæ are entering fruit.	
	7B 2	Scab Codling moth	Thirty days later.	
	2	Codling moth	July 25.	
	2	Codling moth	August 15.	
Pear (three sprayings)	4D	Scale, Psylla	March-April.	Mix 7B and 1B. Use as soon as they appear.
	7B 1B	Fungi Codling moth	Soon as leaves are unfolded.	
	2 or 3	Slug-worm	Late May or June.	
Cherry (five sprayings)	4D	Scale	March-April.	Mix 7C and 1B. Use as soon as seen.
	7C 1B	Fungi Curculio	Soon as leaves are unfolded.	
	2	Curculio	When petals fall.	
	2	Curculio	One week later.	
	2 or 3	Slug-worm	Late May-June.	

PLANT	SPRAY	INSECT	TIME	REMARKS
Plum (six sprayings)	4D	Scale	March-April.	Mix 7C and 2. Applications for curculio must cover every twig, leaf and fruit, as the insect feeds and lays eggs for an extended period. Cultivate the soil to a depth of 2 inches under trees, for a period of five weeks after full bloom of trees. Larvæ are changing to beetles underground at this time and are destroyed by destruction of cells in which they rest.
	7C 2	Fungi Curculio	May, or soon as leaves unfold.	
	7C 2	Fungi Curculio	When petals fall.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
Peach (six sprayings)	4E	Scale	March-April.	
	7C	Fungi	May—early.	
	7C 2	Fungi Curculio	When petals fall.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
Apricot (six sprayings)	4E	Scale	Late March.	
	7C	Fungi	May—early.	
	7C 2	Fungi Curculio	When petals fall.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
	2	Curculio	Ten days later.	
Small fruits (two sprayings)	4E	Scale	April.	Spray for scale only as necessary. 7C is to be used as a preventive measure against all kinds of fungous diseases.
	7C	Fungi	May.	
Shade trees (two sprayings)	4E	Scale	April.	
	7C	Fungi	May.	
Shrubs (two sprayings)	4E	Scale	April.	
	7C	Fungi	May.	
Roses (general)	4E	Scale	April.	Bark beetles, common to everything, are prevented by painting trees with number 10. Apply just before first warm days of spring. Cut out branches already infested and burn. Apply wash again two times during the fifth month later, and again two times during the third month later than this. If this beetle is detected at once it may be destroyed by touching the holes of entry with a sponge soaked in kerosene.
	7C or 8	Fungi	Mid-April.	
	6	Scale	Late April before leaves unfold.	
	8	Fungi	Ten days later.	
	8	Fungi	One week later.	
	6	Aphids	Soon as buds set.	
	8	Fungi	Four days later.	
	(Hyb. Perpetuals begin to bloom)	8	Fungi	
2		Rose-bugs	June 5 to 8.	

PLANT	SPRAY	INSECT	TIME	REMARKS
(Hyb. Teas begin to bloom)	2	Rose-bugs	One week later.	Hybrid Perpetuals cease blooming about the first week in July, but they should be sprayed as often as every three weeks until the middle of August, to prevent fungous diseases, especially if there is much rain and dampness.
	6	Aphids	One week later.	
	8 2	Fungi Rose-bugs	One week later.	
	2	Rose-bugs	July 1 to 7	
	2	Rose-bugs	One week later.	
	6	Aphids	One week later.	
	8	Fungi	One week later.	
	8	Fungi	August 1	
	8	Fungi	One week later.	
	8	Fungi	One week later.	
	8	Fungi	One week later.	

Spraying Calendar

MONTH	PLANT	INSECT	SPRAY	REMARKS
January or February	Apple	Scale	4A	<p>Always mound the earth up about the bole of trees to be sprayed with number 4, for this <i>must not</i> penetrate to the roots of vegetation. The mound of earth catches the liquid as it runs down the branches; it should be taken away as soon as the work is done.</p> <p>Winter spraying for scale is a precautionary measure which should include everything, if scale is known to be present on anything. It is a pest which must never be allowed to gain the slightest headway.</p>
	Pear	Scale, Psylla	4A	
	Cherry	Scale	4A	
	Plum	Scale	4B	
	Peach	Scale	4B	
	Apricot	Scale	4B	
	Small fruits	Scale	4B	
	Shade trees	Scale	4B	
	Shrubs	Scale	4B	
March—late	Apple	Scale	4D	
	Pear	Scale	4D	
	Cherry	Scale	4D	
	Plum	Scale	4D	
	Peach	Scale	4E	
	Apricot	Scale	4E	
	Small fruits	Scale	4E	
	Shade trees	Scale	4E	
	Shrubs	Scale	4E	
April—late	Apple	Scale	4D	<p>Mix 7B and 1B and use as one spray.</p> <p>Mix 7B and 1B.</p> <p>Mix 7C and 1B.</p> <p>Mix 7C and 1C.</p> <p>Mix 7C and 2.</p> <p>Mix 7C and 2.</p>
		Scab Codling moth	7B 1B	
	Pear	Scale, Psylla	4D	
		Fungi Codling moth	7B 1B	
	Cherry	Scale	4D	
		Fungi Curculio	7C 1B	
	Plum	Scale	4D	
		Fungi Curculio	7C 1C	
	Peach	Scale	4E	
		Fungi Curculio	7C 2	
	Apricot	Scale	4E	
		Fungi Curculio	7C 2	

MONTH	PLANT	INSECT	SPRAY	REMARKS
April—late	Small fruits	Scale	4E	Burn out tent caterpillars' nests as soon as detected. Collect and burn all nests of brown-tail moth.
	Shade trees	Scale	4E	
	Shrubs	Scale	4E	
	Roses	Scale	4E or 6	
		Fungi	7C or 8	
May	Apple	Scab	7B 1B or 2	Mix 7B with either 1B or 2, or with both. Spray evergreens when infested with bagworm with spray number 2 diluted one-half. Put kerosene-soaked sand—use one cupful to a pail of sand—around the base of plants to prevent root maggots.
		Codling moth Curculio		
	Pear	Slug-worm	2 or 3	
		Fungi Codling moth	7B 1B	
	Cherry	Curculio	2	
		Slug-worm	2 or 3	
	Plum	Curculio	2	
	Peach	Fungi	7C	
		Curculio	2	
	Apricot	Fungi	7C	
		Curculio	2	
Small fruits	Fungi	7C		
Shade trees	Fungi	7C		
Shrubs	Fungi	7C		
Roses	Fungi	8		
	Aphids	6		
June	Apple	Scab	7B 2	Use spray number 2 promptly if small caterpillars are seen on trees. Repeat as may be necessary throughout the season.
		Codling moth Curculio		
	Pear	Slug-worm	2 or 3	
	Cherry	Curculio	2	
		Slug-worm	2	
	Plum	Curculio	2	
	Peach	Curculio	2	
	Apricot	Curculio	2	
Roses	Fungi	8		
	Rose-bugs	2		
	Slug-worms	2		
	Aphids	6		
July	Apple	Codling moth	2	This is done to catch the second brood of the codling moth.
	Roses	Rose-bugs	2	

MONTH	PLANT	INSECT	SPRAY	REMARKS
July	Roses	Aphids	6	
		Fungi	8	
August	Apple	Codling moth	2	
	Roses	Fungi	8	

X

INSECT HELPERS

IT is very essential that our destructive instinct against those animals which, according to a very great man's very profound classification, are the highest of the six divisions which compose the animal sub-kingdom known to science as *Annulosa*,—the division grouped under the head *Insecta*—shall not be over-developed. We are so constantly impressed by warnings everywhere displayed against malign little monsters that we are in grave danger of never knowing anything about the benign little allies which this group contains. And in our ignorance we are in still graver danger of depriving ourselves of their services through our over-stimulated impulse to destroy.

The destruction of these little creatures is very much what the destruction of horses, and cattle, and sheep, and dogs would be, if we proceeded to slaughter all animals because tigers, and wolves, and panthers, and other savage kinds were inimical to the life and comfort of man. Quite as the faithful sheep dog defends a flock against invading foes, does the dainty lady-bug defend certain other of our possessions against marauding enemies—and though in the interests of truth and

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honesty I suppose we must confess that she does it unconsciously, she nevertheless does it very well, and *as nothing else* can do it.

And quite as the patient horse fetches and carries for man from morning until night, the active bee fetches and carries also, performing a service so great and so important that without it only a comparatively small percentage of man's fruit foods would ever be produced at all. She serves while serving her hive to be sure—but we are none the less dependent upon her.

These two small creatures—the lady-bug and the bee—are examples of the dual service which many of their great group render to the lords of creation—without the lords having anything to do about it. As such examples let us see just what it is that each does.

The lady-bug, in the first place, is not a bug at all, but a beetle—that is, an insect of the sheath-winged order. These have two pairs of wings, the outer always hard and armor-like, and closing down over the thin and folded membranous under pair. True bugs do not have these sheath wings but only gauzy ones; some indeed are devoid of wings altogether and can only run or crawl about.

Like most beetles the lady-bug is predaceous—is in other words a preying, carnivorous little savage, who devours with rapacious appetite other insects, her preference for those of the scale class being especially notable. This taste in food is the reason of her value to man; in feeding herself and depositing her eggs where the newly hatched larvæ will find their favorite

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diet close by, waiting to be eaten, she brings destruction to unbelievable hordes of one of man's most dreaded garden enemies.

The bee belongs to another class entirely—a class of thin-winged insects which have mouth parts made both to bite and to suck. But bees are far too well behaved to bite, though some have been slanderously accused of it. Bees are nectar drinkers—and it is in seeking and sipping nectar that a bee accumulates on her legs and her body the “flower dust” which marks her as a long-summer-day traveler.

This flower dust is the real gold of the vegetable kingdom—the magic, life-laden pollen grains, one of the most precious of the unknowable mysteries of Nature's laboratory. On the bee's body they travel from one flower into another, and from the flowers of one plant into those of another, thus accomplishing that miracle of cross-pollination which Nature, for some deep reason, demands.

Insects help us therefore in two ways: directly, by destroying our fruit's enemies, and indirectly, by being the instruments of this curious exaction termed cross-pollination or fertilization. And there are many kinds of insects working in both classes—so many that it is hardly possible to even hint at their numbers, or their wonderful life stories here. For experts place the total number of different kinds of insects in the world at from two to ten million, of which number only about four hundred thousand have so far been examined, described and named.

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Four-fifths of all the kinds of animals are insects—and some *single families* contain more species than a person of normal vision can see stars on a clear night. It is believed, too, that the greater proportion of animal matter on the globe's land surface exists in the form of insects—in other words, that if all the insects on and in the land could be piled in one enormous heap, with all the rest of the animal kingdom, man included, piled in another, the mountain of insects would be larger than the mountain of animals and men!

Out of these legions it would be difficult to select all of those who are indeed friends to the human race, even if the entire insect world were known. But with anywhere from three-fourths to twenty-four-twenty-fifths of it, according to the correctness of the estimates, still in the darkness of the unknown, it is of course impossible. And it is almost impossible to devise any rule which shall help the layman in determining which of the known insects are which—though such a rule does suggest itself as the food taste and habits of the various kinds are considered.

It is based on the fact that insects are seldom or never, truly omnivorous. They either eat meat or they eat vegetables—or suck the juices from one or the other—but the same insect does not indulge in both. The meat eaters, therefore, being the warrior-hunters or beasts of prey of the insect world, are man's friends; the vegetarians, his everlasting foes. This seems to be a fair standard of judgment for all those which affect man directly, and from it one may formulate a plan of

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action—or inaction—limited to be sure, but pretty certain to be all right as far as it goes. It is simply the adoption of the rule never to destroy any kind of insect creature that is ever caught in the act of destroying another.

Compassion must be leashed with the strong reins of indifference at the writhings of a cutworm in the cruel mandibles of a ground-beetle, or at the frantic terror and agonizing struggles of a baby pear-tree psylla when the “veritable dragon” which is the larva of the lace-leaf fly, seizes it between its pair of great sucking tubes, preparatory to drawing the life fluids from its body. These things must not be discouraged, no matter how unpleasant they are to witness or to think of, else the cutworm will lay low his harvest and the psylla in its turn will soon pump the life from the defenseless trees.

Bees are very much pleasanter creatures, to all outward appearances at least—they behave atrociously to their own kind—and, aiding us indirectly as they do, they are not of course to be measured by any such distressing and murderous test; in fact bees we already know as friends. No spraying or poisoning should ever be done while they are at work, and nothing that will injure them should be used on fruit or ornamental flowers at any time when they are in evidence.

The regulation times for spraying will not interfere with “bee pasturage” if strictly adhered to, as bees are seeking nectar always *before the flower has been fertilized*, consequently *before* the petals drop. The

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falling of the petals is the signal for the application of all those sprays which are aimed at the destruction of worms—those larval forms of numerous creatures which are deposited, in the egg, at some point within the flower, and are thus able to work from the “blow” end toward the center of the fruit. These sprays should *never be used* until this signal is observed, for the sacrifice of a bee may well be regarded as a catastrophe to be most carefully guarded against.

XI

FLOWERS AND POLLINATION

RARELY does it occur to the gardener, and still more rarely perhaps to the person who never gardens at all but who is still an ardent lover of flowers, to consider what flowers really are. They are taken for granted quite as much, in their way, as vegetables are in theirs; and what they are and why they are, and how they fulfil their purpose, ordinarily seem unimportant. It is with their beauty that most persons are concerned.

But these other things are important—highly so—if intelligent work is to be carried on among them, or with vegetation generally. For the differences in flowers make differences in dealing with them very necessary. What, then, are flowers?

Those who remember their botany will recall that flowers are those portions of a plant which bear the organs of reproduction—but how many remember their botany, I wonder. Flowers exist therefore for the purpose of reproducing the species, and the fact that they are beautiful is only incidental. The parts of a flower that make it beautiful are never the essential parts. Indeed, the essential organs—the stamens and

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pistils—may easily pass unnoticed by a casual observer, although the former are distinctly decorative in many flowers—the rose, for example, in its single varieties. The yellow stamens are sometimes so numerous in these that they give an exquisite, soft golden glow at the heart of the flower which greatly enhances its beauty.

Stamens bear pollen or fertilizing dust, while pistils are fitted to receive this dust and to develop, by means of it, into the seed, or the fruit which bears the seed at its heart. All plants therefore which produce, in any form, these two essential organs, produce flowers, although they may not commonly be regarded as flowering plants. We say, for example, of the oak that it does not blossom; but it does, else it would not bear fruits—that is, acorns. And we gather pussy-willows without realizing that they are flowers, but they are—and very interesting flowers too, for there are two distinct kinds and they are borne on separate trees, the staminate or male on one tree, the pistillate or female on another.

This brings us to a phase of flower form which is one of the most important things for a gardener to understand; namely, their deviation from the type, or perfect, flower. A perfect flower is complete in itself, hence its classification as perfect. It is hermaphrodite or bisexual—double sexed—having both stamens and pistils, or pistil (sometimes there is only one of the latter). The natural, single rose is an example of a perfect flower.

FLOWERS AND POLLINATION

But there are myriads of flowers which are not perfect—which are unisexual or single sexed. Some scientists indeed are of the opinion that there is a tendency in all forms of plant life toward flowers of the unisexual form—that it is the step forward in the evolution of vegetation—but that is too big a subject to consider here, besides being wide of the question.

The important thing for us is to know that these two kinds of flowers are borne in two distinct ways on the plant. Sometimes the two sexes are upon the same plant, as in the oak; at other times they are upon separate plants. The willow is an instance of this. When both are found upon one plant it is said of that species that it is monœcious or “of one household;” when they are upon separate plants the species is dioecious or “of separate households.”

There is a still further variation, some species producing the two kinds of flowers—those that are perfect or bisexual and also those that are unisexual—and both kinds—staminate and pistillate—of the latter. These plants are called polygamous. Common bitter-sweet of woods and thickets is an example, also the horsechestnut, maple, sumach, honey locust—and many others.

The importance to the gardener of this variation in flowers lies in its bearing so directly upon the production of seed, otherwise fruit. It is of course impossible for a *solitary* dioecious plant to produce fruit, even though it is of the fruiting or pistillate form. Here is a staminate sassafras tree, outside the window, yellow with

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blossoms. Down the road three hundred feet is another, its pistillate mate. Once or twice I have found on the latter a fugitive berry or two in the autumn, but this is rare. The two are so far apart that the pollen shed by this tree is lost in the air before it reaches the blossoms on the one yonder—consequently fruit rarely “sets.”

Even with those plants whose flowers are perfect and therefore capable of self-pollination, cross-pollination is better, producing usually seed that germinates into stronger and better plants, or else producing fruit of a decidedly superior quality. Nature therefore has arranged to secure cross-pollination for most things, in one way or another, even though they do produce perfect flowers.

Sometimes this is accomplished by ripening the pistils and the stamens at different times, so that when the pollen is shed the pistil of the flower whose anthers shed it is not capable of retaining it. Some plants indeed are self-sterile and absolutely require pollen from another individual in order to set fruit—many times from another variety.

There are about sixty species known to be more or less self-sterile, according to the *Cyclopedia of American Horticulture*. The condition is found among grapes and it is by no means uncommon among orchard fruits. Pears and plums show it most frequently perhaps; some apples, while not exactly self-sterile, are much improved by being cross-pollinated with another variety (providing the right variety is chosen), the Baldwin apple being a case in point.



The natural single Rose is an example of a perfect flower—double sexed, having both stamens and pistils



One of the most fascinating phases of gardening is the study of the self-pollination and cross-pollination that is being carried on throughout the flowering season by Nature's various agencies

FLOWERS AND POLLINATION

Alone this bears excellent fruit, but planted with its proper variety, it bears fruit that is finer still.

Self-sterility is not always constant, a variety that has shown it in one place sometimes not developing it in another. This is owing to climatic and soil conditions probably, the plant doubtless being better adapted to those conditions which do not develop it.

A self-sterile variety sometimes sets fruit which it fails to mature. Thus a whole orchard that is in perfect health and well cared for, may blossom freely, set fruit, and then drop it when it is not more than half grown. New trees of the *same variety* added to the orchard will not improve the situation, but trees of some other variety—and it must be the right one—will bring the whole orchard into vigorous bearing. There must be an affinity between the two however, as well as simultaneous ripening of anthers and pistils so that cross-pollination may take place. Just what this actual affinity is for any given variety, only experiment will determine, ordinarily; the Department of Agriculture is the best help, in this as in all other knotty problems.

Some varieties of ornamental flowers—if we may so distinguish the garden favorites—hybridize so freely that experienced gardeners keep them strictly isolated if they are desirous of keeping the strain pure. Columbines are one of these, separate species mixing and varying constantly if planted together. Flowers of variegated colors are probably the result of cross-pollination—and of course the beautiful hybrids of plant breeders are produced by this method.

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It is a subject not only of deepest interest but of boundless possibilities. Only a suggestion of these can be given in a work of this nature of course, but the wise gardener will pursue the matter further, for it is so far-reaching that no amount of study will be wasted.

Seed is the starting point of plant life; the end and aim of a plant is the reproduction of its species, hence the end and aim of the flower of a plant is the seed. Unless seeds are formed therefore, the whole purpose of the plant is thwarted; which is the reason why many plants will go on in the effort to produce seed—to reproduce their kind—by blossoming again and again when deprived of their blossoms. This is at the bottom of the rule never to let a flowering plant go to seed, but always to cut the fading flowers away before seeds have formed, thus encouraging further bloom.

Perhaps we are cruel to do this; certainly it does seem hard, the patient, persevering struggle that the helpless things carry on to fulfil their destiny. Up they come bravely in spite of greedy shears, in spite of repeated discouragement, just as sweet and just as beautiful as ever—and just as hopeful, bless them! Heigho! Who can a gardener be and not fall to philosophizing?

Double flowers are monstrous man-made forms, unnatural and abhorred by Nature! Sounds dreadful, does it not?—but it is all true. For double flowers are “double” at the expense of the reproducing organs; they have been selected and inbred and restrained and cajoled until they have twenty or fifty or any number of times their normal number of petals, at the expense

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of their stamens—and they cannot therefore fulfil the purpose of a flower and produce seed. They are actually sterile flowers—and the only flowers that ought ever to be called that. The name is applied to the non-fruited male or staminate flower very often, but this application is not the proper one, double flowers alone being sterile, strictly speaking; ray flowers, also called sterile sometimes, are actually neuter.

These, by-the-way, are understood to appear with the small inconspicuous flowers which they encircle, for the purpose of attracting insects. They are the plant's banner, flung out to signal its tiny allies and invite them to the nectar feast which the little chalice of the hardly noticeable true flowers hold. As the insects, thus attracted, make the rounds, their bodies gather pollen in one place and carry it on to another, and the highly desired cross-pollination is accomplished.

The small, flat, white "flowers"—really nothing but clusters of petals—which encircle the cymes of the high-bush cranberry are an example of these, while the old-fashioned snowball or guelder rose—the cranberry's closest relative, for both are viburnums—shows a doubling of these neuter flowers at the expense of every one of the tiny perfect flowers which make up the body of the bush cranberry cyme. Examine these two shrubs and compare the flower clusters of the one with the other; compare especially the ray flowers with the center, smaller flowers of the cluster from the cranberry, and then compare them with the "flowers" that make up the snowball. The difference and the

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likeness is instantly apparent, even to an untrained observer.

In passing let us note that all vegetation does not produce flowers. Rushes, ferns, mosses, certain aquatics, and mud-loving plants reproduce by spores; but this class is of little practical value in the garden, so need not be more than mentioned.

XII

VEGETABLES

THE word "vegetable" unquestionably means something very definite to everyone who comes upon it, anywhere at all—but to define just what a vegetable is, is not so simple a matter as it would seem. Indeed it is likely to become very involved, the deeper one gets into it, yet to cultivate them intelligently we should know pretty accurately what they are.

Suppose that a start is made with the declaration that a vegetable is an edible plant; here is the commonest vegetable of them all—the potato—to prove at once that the statement is wholly inadequate, for the potato is not a plant at all, but only the root of a plant. And squash is actually a fruit, while green corn is a seed!

It is amusing, by-the-way, to note that the law has taken a fling at this puzzling question, and declared solemnly that a "vegetable" is one of the plants eaten, either raw or cooked, during the principal part of a meal, while a "fruit" is one eaten as dessert. In which event cranberry sauce, coming with the roast, must be a vegetable, while rhubarb, served in delectable pie form, is a fruit.

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CLASSES OF VEGETABLES

BELOW THE GROUND	ABOVE THE GROUND		
Roots and Tubers	Stem or part of plant	Fruit	Seed
Beets Carrots Kohlrabi Onions Parsnips Potatoes Radishes Salsify Turnips Celeriac Leek Scorzonera	Celery Endive Lettuce Corn salad Cress Chicory Dandelion Mustard Sorrel Asparagus Cabbage *Cauliflower Kale Mushrooms Spinach Swiss chard *Artichoke *Broccoli Collards Okra Rhubarb Parsley Chevril Nasturtium Martynia	Cucumber Egg-plant Tomato Pepper String beans Sugar peas Squash Pumpkin Muskmelon Watermelon	Green corn Beans Peas

* Flower heads.

But the definition is simple enough after all, evolving from our first statement by the addition of only a word—or, to be strictly accurate, two words. A vegetable is an edible plant, *or part*; that covers the entire field.

Vegetables classify under four distinct heads, and it is well always to think of them according to these divisions, for many things about their culture and requirements depend upon which class they fall into. The proportions are interesting too, as well as the fact

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that two of our favorite fruits find themselves in the list—the muskmelon or cantaloupe, and the watermelon. The list of fifty given will be useful to refer to when the question of fertilizing is under consideration.

All of those plants whose edible portions grow below the ground—all root vegetables—should have light, mellow, rich soil. All stones and even small pebbles should be worked out of it, if perfect roots are to be produced, smooth and clean on their surfaces. Some gardeners, growing specimens for exhibition, go so far as to sift earth, well mixed with pulverized rotted manure, into holes previously dug out, but this is more trouble than many will care to take, and not necessary excepting on unusually stony soil or hard clay banks.

For the benefit of those who may wish to try this, or who have land demanding such preparation, however, it may be said that for the deepest-rooted vegetables, like salsify and long beets, the holes must be two feet or more deep and three to four inches broad. The earth must of course be taken out, and the sifted earth put in place of it. Sow three or four seeds in the space, but leave only one strong seedling to mature finally. Thinning must always be done before vegetables crowd each other at all, to be effective.

All vegetables that are used during the summer—all green vegetables—are better if not allowed to mature fully. This is one advantage of having a garden, for unless such vegetables are home grown, they are practically unattainable. Market gardeners grow for appearance and size, naturally, and must therefore

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bring their products to full maturity before harvesting them. The home garden, on the contrary, should yield its summer foods while they are young, not fully grown, and consequently juicy, tender and sweet.

The table which is appended gives planting dates for the latitude of New York. A hundred miles north or south means always a week's difference in time—south being earlier of course and north later. The several dates given for some of the vegetables are for succession crops, and do not mean that sowings *must* be made as often, nor as many times, as the table shows. They *may* be, however, the latest date being early enough to allow for the maturing of the crop before severe weather nips it. Special cultural directions cannot be given here, for these require volumes in themselves and are distinctly beyond the province of a primer.



A group of frost-resisting vegetables. By planting such as these the life of the vegetable garden may be greatly lengthened



Possibly more important even than securing good seeds is a carefully planned scheme of planting the vegetable garden so as to make the most use of the land

Vegetable Planting Table

VEGETABLE	SOW IN		NUMBER OF SOWINGS	DISTANCE BETWEEN		DAYS TO COME UP	WEEKS TO MATURE	QUANTITY OF SEED FOR 100 FEET	DEPTH TO SOW	REMARKS
	Hotbed	Open Ground		Plants	Rows					
Asparagus, seeds roots		April or May April	1	1 foot 1 foot	2 feet 2 feet	20-30	3-4 yrs 1-2 yrs	2 ounces	1 inch	Roots are best for the small garden; salt the ground in spring.
Beans, bush	February 15; set out in May.	May 1 and 15 June 1 and 15 July 1 and 15 Aug. 1 and 15	9	3 inches	2 feet	6-10	6-11	1 pint	2 inches	The English bush beans are almost as hardy as peas, and may be planted very early. Climbers are more tender, especially Limas. These go in hills.
" climbing	May 15 June 1		2	3 feet	4 feet	6-10	9-14			
Beets, early var.	March; set out May 1	April 1 to 10 May 5 June 15 July 15 Aug. 15	6	4 inches	1 foot	8-10	9-11	2 ounces	2 inches	Sow in drills and thin the plants when there are three or four leaves; use the tops for greens.
" main crop										
" winter crop										
" early var.										
Brussels sprouts	February	May 15	2	18 inches	30 inches	6-10	14-17	$\frac{1}{2}$ ounce	1 inch	Firm soil thoroughly over seed.
Carrots	February	April 1 May 10 June 15 July 15 Aug. 15	6	4 inches	18 inches	10-15	9-12	1 ounce	1 inch	
Corn		May 15 June 1 and 20 July 10 and 20	5	8 inches	4 feet	8-10	9-14	$\frac{1}{2}$ pint	2 inches	If sowed in hills, make them three feet apart and five plants to the hill.
Cucumbers	March, on inverted sod.	May 15 June 1 July 1 and 15	5	4 feet	4 feet	6-8	9-12	$\frac{1}{2}$ ounce	1 inch	Plant 10 seeds to a hill; thin to 3 or 4 plants when well started.

VEGETABLE	SOW IN		NUMBERS OF SOWINGS	DISTANCE BETWEEN		DAYS TO COME UP	WEEKS TO MATURE	QUANTITY OF SEED FOR 100 FEET	DEPTH TO SOW	REMARKS
	Hotbed	Open Ground		Plants	Rows					
Egg-plant	March	Set in June	1	30 inches	30 inches	10-15	18-24	$\frac{1}{2}$ ounce	$\frac{1}{2}$ inch	Transplant 1 month after sowing; best after being frost touched.
Kale—for fall " for spring		June 1 Aug. 15	2	2 feet	30 inches	6-10	12-16	$\frac{1}{2}$ ounce	$\frac{1}{2}$ inch	
Lettuce	February	April 1 and 15 May 1 and 15 June 1 and 15 July 1 and 15 Aug. 15	10	1 foot	1 foot	6-10	10-14	$\frac{1}{2}$ ounce	$\frac{1}{2}$ inch	Sow in drills and thin out as plants grow; may be wintered in coldframe or under straw if in protected place.
Muskmelon		May 1	1	4 feet	4 feet	6-10	13-18	$\frac{1}{2}$ ounce	1 inch	Improved by winter freezing.
Onions	February	April 20	2	2 inches	18 inches	6-10	17-20	1 ounce	$\frac{1}{2}$ inch	
Parsnips		April 15	1	6 inches	18 inches	12-18	14-21	$\frac{1}{2}$ ounce	$\frac{1}{2}$ inch	The August sowing should be of a quickly maturing variety such as the "extra earlies."
Peas, smooth " wrinkled and smooth " " " " smooth		Mar. 15 and 30 April 15 and 30 May 15 and 30 June 15 and 30 Aug. 1	9	2 inches	2-4 feet	5-10	7-9	1 quart	2 $\frac{1}{2}$ inches	
Peppers	March	Set out June 1	1	30 inches	30 inches	10-14	19-21	$\frac{1}{2}$ ounce	$\frac{1}{2}$ inch	Main crop in late May or June.
Potatoes		April; May or June	2	1 foot	30 inches	15-25	12-14	1 peck	6 inches	
Pumpkins		May	1	8 feet	8 feet	6-10	14-18	$\frac{1}{2}$ ounce	2 inches	Sprinkle hills with air-slaked lime.

VEGETABLE	SOW IN		NUMBER OF SOWINGS	DISTANCE BETWEEN		DAYS TO COME UP	WEEKS TO MATURE	QUANTITY OF SEED FOR 100 FEET	DEPTH TO SOW	REMARKS
	Hotbed	Open Ground		Plants	Rows					
Radishes	February	April 1 and 15 May 1 and 15 June 1 and 15 July 1 and 15 Aug. 1 and 15 Sept. 1 and 15	13	2 inches	6 inches	4-6	4-7	1 ounce	½ inch	Sow winter radishes June 1 and cultivate like turnips.
Salsify		April 1	1	6 inches	18 inches	8-12	18-22	1½ ounces	1½ inches	Prepare soil 18 inches deep.
Spinach		April 1 and 15 May 1 and 15 June 1 and 15 July 1 and 15 Aug. 1 and 15 Sept. 15	11	1 inch	1 foot	6-12	9-11	1 ounce	1 inch	Best in a rich soil: last sowing is main or winter crop; mulch after ground freezes to prevent freezing and thawing alternately.
Squash (summer)		May 1 June 1 July 1 May 15	3	4 feet	4 feet	6-10	9-11	½ ounce	1½ inches	Sow 8 or 10 seeds in a hill; thin to 3 strongest plants when fourth leaves appear; draw earth over joints in stems.
" (winter)			1	8 feet	8 feet	6-10	14-18			
Tomatoes	March	Set out May 15	1	3 feet	3 feet	6-10	18-21	1/16 ounce	½ inch	
Turnips early		April 15 May 1 and 15	7	6 inches	1 foot	5-7	9-11	1 ounce	½ inch	The August sowing is for the fall crop; use early varieties for the other sowings.
" "		June 1								
" main crop		Aug. 1 to 10								
" early var.		Sept. 1 and 15								

XIII

FERTILIZING AND FERTILIZERS

IT is astonishing that such a measure of good luck attends the guesses which most of us make at supplying the needs of the soil—or, to be more exact, the needs of the plants which grow in the soil—because very few really know anything about it. But of course the makers of commercial fertilizers have helped us greatly, and there are many, scientifically compounded and of real value, upon the market, every pound accompanied with directions for its application to the soil. What these compounds do, however, and why they do it, and why it needs doing, are details of the matter that even very advanced gardeners do not trouble to concern themselves with—at least not often. The general idea is to make the soil “rich,” and if one thing doesn’t produce a crop luxuriant enough to indicate that this has been accomplished, something else is tried—something that is hit upon somehow, somewhere, that somebody says is good because it has benefited some other garden.

Of course everybody knows that the growth of a plant requires food just as much as the growth of a

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child or a bird or anything else in creation requires it. But the ideas about this food are very vague; "what plants eat" is an untold tale, mysterious, almost chimerical to the practical mind accustomed to seeing before believing. Let us see if we cannot straighten this out a little and come to a real comprehension of plant feeding; then fertilizers will not seem so deadly dull and uninteresting—and incomprehensible.

The food of plants consists of thirteen "chemical elements." Nine of these are taken by the plant directly from the soil—these are the pure mineral plant foods—three are taken from water and from air, and the thirteenth and last is taken principally from decaying organic matter in the soil.

In order to understand this quite clearly let us stop just here long enough to take a look at the chemical classification of the soil, spoken of in a previous chapter. Soil is made up of mineral matter and organic matter—two forms that are, of course, widely different—and to get at this composition of it in the simplest way possible we will follow the suggestion of one of the Department of Agriculture experts and magnify a cubic inch of soil, in the imagination, to a cubic mile—and then look it over. It becomes very vivid, and the processes going on in it are plainly revealed, under such an examination.

It will look like a mass of rocks and stones varying from the size of a pea to boulders several feet in diameter. These are the mineral particles—in common parlance the "dirt"—which predominate and

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form the foundation of all soil. Among these rocks and stones, in many of their large and small interstices, will be decaying pieces of plant roots and stems and other organic matter, which appear very much like logs and pieces of logs rotting among masses of rock and gravel. All of this organic substance will be dripping with water like a soaked sponge, while all the stones and rocks have a layer of water over their surfaces. And finally, in all the spaces where there is nothing else, there is air—indeed nearly half the volume of the whole cubic mile is air.

A plant root coming down into this magnified cubic inch of soil would be of course an enormous thing, pushing its way among the rocks and stones and decaying matter with a great, tireless, steady, resistless pressure that would move the biggest of them. Near the tip of this ever extending and down-reaching growth, small hollow tubes—root hairs—would be seen reaching out and feeling this way and that, sucking the water from the surfaces of the rocks and from the dripping, spongy masses among them, by drawing it through their thin and delicate walls.

In this water is the mineral food, dissolved off in the minutest particles from the “rocks”—and it is somewhat staggering to note, by the way, that in order to produce one pound of growth in dry matter—that is in branch and leaf, flower and fruit—from 300 to 800 pounds of water must be taken in by a plant's roots, drawn up through its stalks and branches, and discharged or “transpired” by its leaves. Think of

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the stupendous work being carried on by all the silent green things that we give scarce a thought to in the long, drowsy summer days!

All fertilizers present, in different forms, three essentials—phosphoric acid, potash and nitrogen. The latter is the last of those thirteen chemical elements mentioned which feed vegetation—the one which comes principally from decaying organic matter in the soil—and in some respects it is the most important of all. Unfortunately it is the one most easily lost—nitrates being very soluble—through washing out, or exhausted in other ways; therefore it is the one which should be applied only in sufficient quantity for the immediate use of the plants to be grown, and just at the proper time for their needs. It is usually well to wait until they are above the ground.

Surplus phosphoric acid and potash, on the contrary, will usually remain in the soil until succeeding crops use them up, so it does not matter so much if these are applied in excess. They are not wasted.

What is known as a complete fertilizer is a combination of these three in the proportion generally of 1 part nitrogen, 2 parts phosphoric acid and $2\frac{1}{2}$ to 3 parts potash. Such a fertilizer will meet all requirements of the average garden, especially if the soil is treated with lime first. Lime is not a fertilizer in the strictest sense, but it sweetens the soil as well as helps to bring about physical and other changes that make plant food available.

The sources of each of these three fertilizer ingre-

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dients are important to know and remember, for even though a complete commercial product that just suits one's garden is found, it is well to have an intelligent understanding of its composition. Many times the application of one of the three is all that is needed, and where this is the case it is much better to use only the one—for gorging the soil is as bad as starving it.

Nitrogen is supplied by nitrate of soda, sulphate of ammonia, cotton seed meal, high grade dried blood, green manuring—that is, a leguminous crop such as cow peas, clover of all kinds, soy beans and others, grown and plowed under—and by stable manure. No fertilizer is better than the latter if properly handled, and all fertilizers should be supplemented by it for the humus that it carries into the soil.

Potash is furnished by muriate and sulphate of potash—the latter is preferable as it can be used on all plants while the former cannot—by a crude German product called kainite, and by unleached wood ashes. The latter of course yield it in a much less degree for a given bulk, but they are invaluable as a fertilizer.

Phosphoric acid comes in “floats”—that is in South Carolina rock from the phosphatic beds of that state—in what are known as superphosphates, and in the various kinds of plain bone meal and bone ash or ground bone “flours” that are on the market.

The work of these three elements is divided of course, but generally speaking nitrogen promotes luxuriant growth of leaf and branch, hence is the greatest stimulant to those vegetables especially of which we



It must be remembered that plants cannot continue to draw their necessary nourishment out of a garden year after year unless their particular needs are studied and met by supplying the proper fertilizer



The roots of a Pea vine, showing the little nodules which are instrumental in extracting nitrogen from the air through the soil

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eat the tops or leafy portions; potash builds up and strengthens wood and fruit, while phosphoric acid seems to be the food which flowering plants, whether shrubby or herbaceous, most appreciate.

Learn to watch your garden and find out from the plants and the way they grow just what it is that they need. Do not, for instance, give nitrogen when top growth is rank and luxuriant, but fruit of poor quality and not abundant, for such a condition probably means that trees are starving for potash. Of course all the elements should be present in order to get the best results—but frequently it is necessary to supply only one in order to make the proportions right, as already suggested. The trick is to find out which one.

It is largely a matter of common sense, once you know what is what—and without knowing this no amount of directions will be any real help. It is necessary to realize what is going on down in the ground where the roots are doing their work—how they are gathering up one substance and another in the tiniest and most minute particles—in order to realize that a very little too much of one thing or a very little deficiency of the other may actually work ill to a plant—may surfeit or starve it.

Finally, there is one other thing about the soil that should here be mentioned, partly for the reason that it is so generally overlooked in all that is said or written about soil, good or bad, and partly because it is interesting. It is a phase of soil fertility that does

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not perhaps enter into the beginner's gardening, but who can tell what moment the beginner, inspired by success and other things, is going to branch out and become a real scientific agriculturist who wants to know everything? And then besides, who can know too much, even though he be but a beginner?

It is only recently, comparatively, that investigators have been led to believe that plants give off certain organic substances during the processes of growth which, accumulating in the soil, are harmful to the successive growth of plants of the same kind. This may be the reason, or one of the reasons, why the benefits of crop rotation are so marked: the soil is freed from the toxic matter emanating from one species in the three or four years during which other crops are grown upon it. Sometimes—not often to be sure, but sometimes—poor and sterile soil may be poor and sterile because thus poisoned.

But this is a big subject, and such a condition will hardly occur in any excepting a very extensive garden. So one need not go into the matter at first. However, remember it if later experience ever brings you the baffling problem of a soil that consistently and obstinately produces only failure under every kind of manipulation. There are such—soils that *will not* yield nourishment enough to sustain plant life—but happily they are being studied and experimented on until the reasons for their sulkiness stand small chance of remaining secret much longer. And every State Agricultural Experiment Station is

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ready to give anyone who may ask, all the information which they have acquired on the subject—or to go farther and take up the individual problem by making an analysis of a soil specimen submitted to them and advising according to that analysis.

It is decidedly the part of wisdom to apply for this expert advice when an unusual condition exists; and such application is not only encouraged but it is urged by the Department, for of course each new problem means further opportunity for departmental research, and therefore a greater possibility of important discovery.

XIV

PROPAGATION WITHOUT SEEDS

SEED is of course the beginning of plant life, but Nature does not limit herself to seed alone for plant propagation; indeed she behaves with some things as if she expected almost their every effort in the struggle for existence to be thwarted. And these are the things which we commonly speak of as spreading from the roots, or from suckers or stolons.

It is this determination in every bit of branch or root to live and grow, which makes the process known as layering possible. This process is the simplest means at the gardener's service, other than the sowing of seed, for increasing the number of any given specimen. Being a perfectly natural method of reproduction, the most inexperienced are practically certain of success with it, and it has two advantages—possessed by cuttings and graftings too—over seedage.

The first is the certainty of its always preserving the identity of a species or variety, a thing which seedlings cannot always be counted upon to do. Instead of "running true" they have a way of playing curious pranks sometimes, strongly suggestive of those unruly

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human offspring in whom little resemblance to either parent, or any known ancestor, can be traced—those profligates or geniuses, as the case may be, who startle their relatives and sometimes stir the world. This variation does not happen commonly, to be sure, with the plants ordinarily dwelling in a garden, but there are innumerable things with which it does happen occasionally—usually highly bred varieties—and some with which it invariably occurs, and which therefore positively cannot be reproduced from seed.

The second advantage which plants produced by layering have is a curious, anomalous combination of youth and maturity—for a plant produced by layering is as old as the parent plant, in one sense, yet as young as its own newly formed roots and independent life, in another. And in this combination there seems to dwell all the lusty vigor of youthful growth and the luxuriant productiveness of maturity. Indeed it is no unusual thing to see, in a nursery, absurd little “shrubs” not more than eight or ten inches high, bearing great trusses of blossoms, quite in a grown-up fashion—stock, of course, that has been grown from layers or cuttings—or possibly grafts. Ordinarily a plant of such diminutive size would be only a seedling of a year’s growth, at least two or three years removed from even the most precocious attempt at producing blossoms.

Nature resorts to layering with many species. The sweet trailing arbutus of the woods is one example; the noxious poison ivy is another; the strawberry of garden and field, and the blackberry, whose canes lie along the

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ground, are more familiar ones perhaps, the former indeed being regular "walking" plants, journeying along from season to season by means of their runners, which creep out and root to form new plants. The berry canes root at the nodes of the stems without such special appendages, and do not as a consequence travel so fast.

The operation of layering depends upon the tendency of plants to produce roots from what is called the "cambium zone," or layer, of their stems—that layer of tender tissue between the bark and the inner wood, along which the nutritive juices flow. As a matter of fact roots are produced by stems ordinarily, and not stems by roots, though we are not in the habit of thinking of plant growth as progressing thus. Commonly roots are supposed to give rise to stems, but they do not.

A root may appear anywhere along a stem, but the most favorable place to invite root formation by covering the stem with earth, is at the nodes; just as at this point growth of a branch above ground may be most confidently expected. Young branches are usually chosen for layering, because they are more pliable and easily bent down; and they may be removed from the parent plant when they have rooted without affecting it as much as the sacrifice of heavier growth would. The season of greatest activity is most favorable to the speedy rooting of layered stems—so of course spring or early summer is chosen for the work.

There are, generally speaking, four methods or forms of layering, though some differences in detail

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bring the number to double this—but they are all modifications of, or developments of, the one idea, which is to cover a node in a stem with earth. Roots tend eternally away from the light and towards moisture, hence they must have earth in which to bury themselves, where the one is excluded and the other conserved. A very little pile of earth over a stem is enough, however, to encourage them to make a start, and their activity usually commences at once.

To layer a vine or somewhat prostrate growing shrub, lay a branch or cane of the previous season's growth—unless otherwise specified—down along a shallow trench, and cover it at intervals of four or five inches, leaving a node or two between each covered space so that shoots may rise as well as roots descend. When these shoots have made a good start, fill in the uncovered spaces up to, and around, them, until they have the appearance of a row of separate little plants growing from the ground. Do not sever them from the parent plant however, until late in the fall or in the following spring. The time of course depends on when the branch was laid down, and also upon the plant's ability to root quickly. Some things must be left undisturbed much longer than others.

Serpentine layering is advocated by many, as it is supposed to induce a more even flow of sap and therefore a correspondingly even distribution of roots along the layered stem. It is the same as the simple layering just described, except that the stem is arched *above* the ground, at the uncovered spaces, while the portions

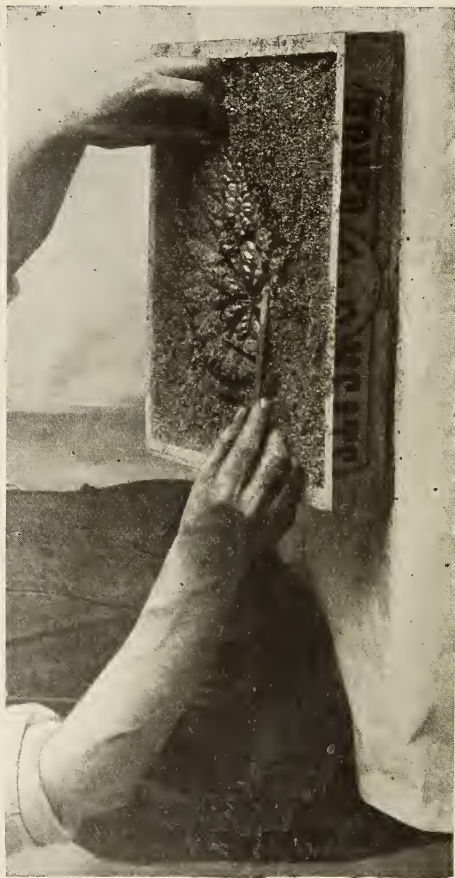
to be covered are curved *down* beneath it. This serpentine form is repeated to the end of the branch, where the tip is finally turned down into the earth. As the tendency of sap is to flow to the end of branches and make there the strongest growth, it is not unlikely that there is an advantage in thus intercepting it by curves, though some do not think it worth while. Quick growing vines seem to respond to it very satisfactorily however; and it is worth trying on the season's growth of a clematis or Wistaria.

A single plant of honeysuckle or almost any hardy vine—honeysuckle especially roots very readily—may be carried the length of a wall or fence by simply burying each season's longest branches either in the serpentine or simple layer, and going on each successive season from where the last left off. In such a situation the plants springing from the layered sections need not be severed and transplanted, for they are already where they are wanted.

With shrubs or trees, branches must of course be bent down to reach the earth. Usually they are held in place by a forked stick driven firmly over them, after which the end of the branch is turned abruptly up so that the tip stands erect out of the ground. This is held by tying it to a stake. The bark will be ruptured by the sharp bend underground, and this is usually enough of an obstruction in the flow of nutriment to induce roots to put forth in search of more; but lest it should not be, a cleft may be made in the branch, near a node, from below up, through not more than a third of the total



The Geranium is one of the easiest plants to propagate by means of cuttings. This plant has been pruned of many cuttings that were potted separately to form new plants



Begonia Rex is one of a few plants that root very readily from the leaf, this being laid on wet sand and punched through with a knife or stick

PROPAGATION WITHOUT SEEDS

thickness of the branch. Sometimes it is well to remove a ring of outer bark entirely, all around the stem, but this is not necessary except with plants which have exceptionally thick and hard bark.

Stool or mound layering requires a little longer time as there must be due preparation for it. The shrub from which new plants are to be propagated is pruned back severely in the spring—headed in to nothing but low, short stubs—to induce a free growth of young and tender sprouts. When these strong young shoots are well grown—usually by the middle of summer—a mound of earth is piled entirely over the old plant and brought up some distance on the stems of the young shoots. This induces them to root freely, and by the succeeding spring they are ready to be dug up, separated and planted as individuals.

Tip layering is exactly what the name implies—the laying down of a tip alone, which, bent to the earth, is buried for a few inches. Branches which will not bend enough to be forked down and turned back up, may sometimes be rooted by tip layering. Three to four inches is deep enough to cover stems in practically all cases, whatever form is chosen for the work.

Cuttings are very much like layers, but differ from them in that they are separated from the parent plant before any roots are formed, and the whole process of root formation has therefore to be carried on independently. For this reason they are not so simple an undertaking for the amateur as layers; the latter can—indeed must—be left alone, while cuttings require care

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and must, under some circumstances, be watched very closely.

They may be made from both ripened and green wood, and they may be taken from the root, stem or leaf of a plant. They are designated accordingly as hard or ripe, and green; and as root, stem, or leaf cuttings. Green cuttings are made from the soft wood—the succulent and tender, most recent growth—or from the hardened growing wood—the growth that is hard but is not yet fully ripened or turned into actual wood fibre. Ripe cuttings are made from the fully matured and ripened wood.

The best authorities agree that hard wood or ripe cuttings will practically always root, though it takes longer and they are not always the finest plants when they do “take hold” and grow. Cuttings of green or soft wood are a doubtful undertaking, and are liable to die before they have had time to root—therefore they are likely to prove very discouraging to the beginner.

The practical value of cuttings lies in the opportunity which they offer of turning one currant bush into a dozen in a single season, or making twenty grape vines grow where one grew before, with absolutely no outlay. Ornamental shrubs and perennials, too, may of course be multiplied in this way, though the latter are usually increased in a simpler way by division of the roots every two or three years.

Cuttings of hard wood may be taken any time when the plant is dormant; it is usual to prepare them after the leaves fall in the autumn and let them lie through

ROPAGATION WITHOUT SEEDS

the winter to callous. This callus is very necessary and unless it forms, no roots will appear. It is occasioned by the swelling of the inner-bark at the severed end or base of the cutting; this gradually rolls out and over the entire raw or cut surface, covering it with new tissue in practically the same way that the wound left on a tree by pruning off a branch, is covered. Usually this takes from two to three months, and cuttings are sometimes prepared thus, long before they are to be set into the ground. On the other hand, they may be taken from the parent plant in the fall and set immediately, out-of-doors.

Ripe cuttings should be 6 to 8 inches long and should contain never less than two buds or two pair of buds—and there is no harm in having a dozen. The cut at the bottom does not have to be made immediately below a bud, though it is well to have it come at such a point. It should slant however, in order to furnish as broad a diameter as possible for the sending forth of roots. Rub off all except the upper bud or pair of buds, and plant with a dibble, just as a seedling is planted. Never thrust a cutting forcibly into the ground just because it is easy to do so; they should be set carefully and treated quite the same as a rooted plant in this respect. Place them two inches apart and set them deep so that only the remaining upper bud or pair of buds is just above the surface. Firm them by tramping, and mulch them heavily before cold weather sets in.

Hardened cuttings—that is, cuttings of growing wood which is old enough to be hard without being

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turned into actual wood fibre—may be taken late in July or early August and rooted indoors, before cold weather usually, in flats filled with clean, well packed, sharp sand—*no fertilizer whatsoever* should be applied, and no earth should be mixed with it. But they should be carried over the winter indoors rather than set out after they have struck root, for their fibre does not harden sufficiently, during the time they are rooting indoors, to bear the severity of winter, and they are very likely to die if set out. Keep them protected from strong sunlight while rooting and keep the sand constantly saturated with moisture. Give them pure air and ventilation too, but do not let wind and cool air reach them. They may be potted after they are well rooted, just as any plant would be.

Cuttings that are to lie over for the winter to callous should be tied in bundles with tarred string—“varmints” hate the tar and will leave it severely alone—and buried a foot and a half deep, *upside down*, in a sandy, thoroughly drained and well protected place outdoors, and then well mulched; or they may be buried in moist sand or moss in a cool cellar. Plant them outside in the spring, just as those that are set out immediately after taking from the parent shrub are planted; or plant them indoors in the sand flat if preferred. They are ready in either case to go into their permanent places by the following fall.

Root cuttings are made in the autumn, very much as hard wood cuttings are, and allowed to lie over the winter to callous, or planted at once in flats filled with

PROPAGATION WITHOUT SEEDS

equal parts of sand and thoroughly rotted leaf mold. Set them horizontally, and make them about two inches long; cover them an inch deep and firm the soil down. Keep moist and rather cool; a cool cellar is a good place for them. When they are ready to grow—when they show growth above the earth—they may be brought where it is warmer.

COMMON SHRUBS PROPAGATED BY LAYERING

Calycanthus; Carolina allspice or sweet shrub: simple layers, put down in summer, severed in late autumn.

Exochorda; pearl bush: simple layers, put down in summer, severed in late autumn.

Forsythia; golden bells: simple, serpentine, or tip layers, put down in summer, severed in late autumn. Tips will root where they strike the ground, often without earth over them.

Kerria; corchorus or globe flower: simple layers, put down in summer, severed in late autumn.

Philadelphus; garland flower or syringa: simple layers, put down in summer, severed in late autumn.

Rhus; sumach; simple layers, put down in summer, severed in late autumn.

Ribes; flowering currant; mound layers, covered in summer, severed the following spring.

Viburnum; viburnum, snowball, etc.: simple layers put down in summer, severed in late autumn.

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COMMON SHRUBS PROPAGATED BY CUTTINGS

Ceanothus; New Jersey tea: readily from green cuttings in spring; ripe cuttings in autumn, set at once in flat, in coldframe or indoors.

Cornus; dogwood or cornel: those of naturally soft-wooded growth from ripe cuttings readily; all from nearly ripe cuttings, in summer.

Cydonia Japonica; Japanese quince: root cuttings in the fall or early spring.

Diervilla; Weigela: green or hardwood cuttings.

Deutzia; Deutzia: green or hardwood cuttings.

Hydrangea; hydrangea: half ripe or nearly ripe cuttings in summer, in flats; also ripe cuttings.

Sambucus; elder: cuttings of ripe wood or root cuttings.

Spiræa; spirea: ripe wood cuttings.

Syringa; lilac: green cuttings made in June and set in flats indoors; also hardwood cuttings.

Crimson rambler, yellow rambler, memorial (*Wichuraiana*) and all prairie (*setigera*) roses; hardwood cuttings, of the season's growth, taken in late autumn, held over to callous and planted out in spring.

XV

LAWNS

IT is an easy and simple matter to establish thick green turf if the foundation is well laid, but few things in gardening are more hopeless than the attempt to make grass grow where the grading around a house has been done with the subsoil excavated from its cellar. Nothing but weeds can grow in this hard, sterile earth, and even these give it up sometimes; for subsoil does not contain organic matter—it is what is called inorganic soil—and organic matter is necessary to plant life.

The extra trouble and cost of first removing top soil and putting it to one side, in a place by itself, may seem a waste, but if this is not done it is not only necessary to spend two or three times the amount of money in efforts to quicken the inorganic soil, but an immense amount of precious time as well—and even after all this, satisfactory results are rare.

Subsoil must be exposed to the action of the sun and rain and air for years before it is mellowed; and in addition to this treatment which only time can give, it must have humus, in quantity—decayed organic matter, both plant and vegetable. With top soil removed first however, to a depth of eight or ten inches—or

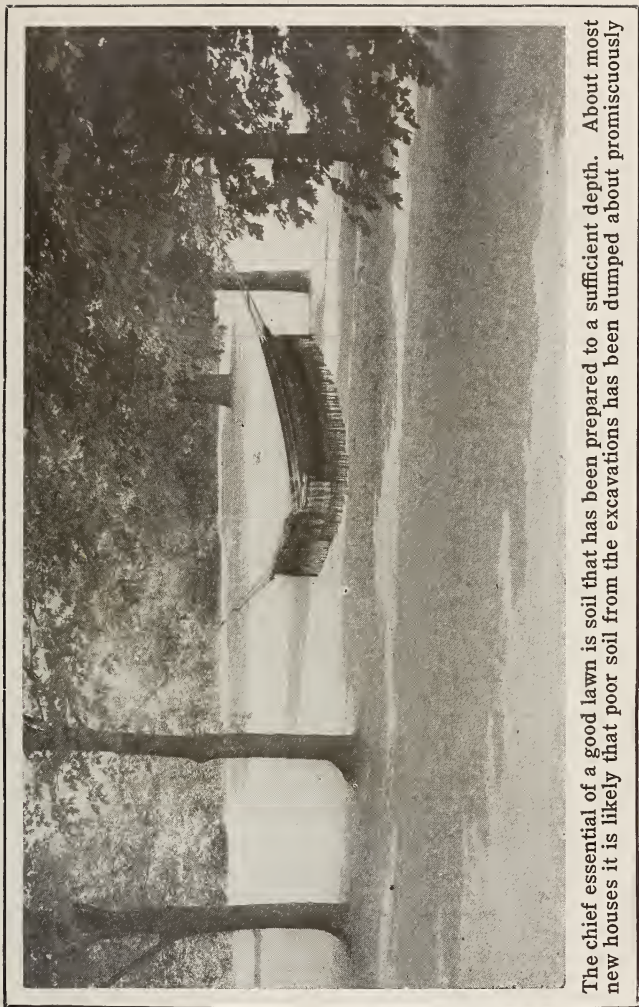
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whatever depth it may show—the grading may be done with the subsoil, after construction work is over, and then the top soil returned to the *top*, where it belongs; and the rest is easy.

Very rich, or very much enriched, soil is not necessary for a lawn. Fertilizers promote swift growth usually, which is just what a lawn ought not to be forced to make. Slow and sure suits grass better—and even poor soil will support such growth, if the right kind of seed for the place is chosen. Of course rich, deep loam is the ideal, but there is no reason to be discouraged if this is lacking, nor for drawing in quantities of top dressing to help out.

If one is possessed of patience enough to wait a season for a lawn, for the sake of its future, a green manure crop is an excellent thing to start with. Cow peas are perhaps the best of the numerous leguminous plants which may be used for this purpose, growing as they do on any and all kinds of soil. They should be sown about the middle of May, in the latitude of New York, and plowed under in the early autumn. On clay soil they are best plowed under while green, but on sandy, loose soil the vines should be allowed to decay before being turned in.

Farther north where cow peas will not mature their seed, field peas, which are sown in the spring, may be substituted. These must be sowed a little thicker than the former, three pecks to an area of 100 x 100 feet being needed, while of the cow peas two pecks for the same plot will be enough. An after treatment of lime at the



The chief essential of a good lawn is soil that has been prepared to a sufficient depth. About most new houses it is likely that poor soil from the excavations has been dumped about promiscuously



Constant and regular mowing, with occasional rolling, will steadily improve turf if the foundation soil is good. Use a wooden rake, or, if a steel one, hold the handle almost vertically to prevent tearing the grass out by the roots

LAWNS

rate of 250 pounds for the plot is advisable if the earth is soggy and acid. When angle worms abound in great numbers it is a pretty good indication of its being needed, badly.

Grass seeds are offered by the best seedsmen in mixtures which will usually do all that is promised for them; it is not therefore the part of wisdom for the beginner to undertake the working out of a combination for himself, for the proportions vary for varying conditions. The grasses that are most generally combined, however, are redtop (*agrostis vulgaris*), Rhode Island bent grass (*agrostis canina*), English rye (*lolium perenne*) and white clover (*trifolium repens*).

These form a most successful mixture for the northern states. In the south the Bermuda grass (*cynodon dactylon*) and the awnless brome grass (*bromus inermis*) are used extensively because they withstand drought. The so-called Bermuda grass is not hardy north of Virginia, however. The famous Kentucky blue grass is excellent where it is good, but it dislikes sour and acid soils, it is slow in establishing strong turf, its color fails in hot weather, and it is really no better than the right kind of a mixture.

Mixtures for shade, for slopes, for the seaside, for arid places, and for establishing especially strong turf which will stand tramping without deteriorating, are all obtainable of reputable seedsmen. It is simply a matter of selecting the necessary kind.

Seed should be sown on a quiet day, in early spring

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or fall, but it may of course be sown at any time during the summer. Very hot dry weather is naturally unfavorable to its germination and growth however, and therefore from April first until the middle of May is regarded as the best time. Fall sowing may be done as late as October, though late September is better.

Grass seed is easily broadcast by hand, once the "hang" of the sifting motion is caught. It should not stream back from between the fingers but should be scattered from between the ball of the thumb and the fingertips, on the palm side of the hand, as the arm is swung from side to side. As the sowing ought always to be done in two directions, the seed should be divided into two parts and one of these used one way, one the other. Walk backwards and against the current of air which will probably be in evidence when you begin scattering the fine seeds, on even the quietest day. When all the space is covered thus, in long parallel rows, take the remainder of the seed and go over the ground again in the same way, but at right angles to the first direction. This insures even seeding all over.

Be liberal with seed. An abundance of grasses leaves less chance for weeds to take possession, and fine grasses cannot fill rapidly if seeded thinly. For the before-mentioned area of 100 x 100 feet $1\frac{1}{2}$ bushels is none too much. And this should be purchased by weight and not by dry measure. A first class lawn mixture will weigh well up towards twenty pounds to the bushel.

It is far better to get the re-cleaned, therefore higher

LAWNS

priced, seed than to waste money and patience on the part chaff and part sweepings which help to make up the bulk of the cheap grades. The best is none too good in the matter of grass seed.

The lawn surface may be rolled after seeding, but this is not essential, particularly if the ground is a little damp when the seed is spread. It adheres to the earth usually under such conditions, without any firming down whatsoever. The very best seed, under the most favorable conditions, will produce a growth that ought to be clipped with the lawn-mower in about five weeks from the time of sowing. This is of course only under the most favorable conditions; but cutting may always be done sooner than one might anticipate after seeding. It ought never to be neglected a day, particularly on a new lawn.

No lawn ought to be shaved down close to the earth; two inches is the best height for all sorts of places and conditions. But to keep this height, grass must be mowed often—sometimes as often as every four or five days. This makes it possible to leave the clippings where they fall, which it is always highly desirable to do. The roots of the grass need the protection as well as the nutriment which they afford.

Go over the lawn in the spring with the roller, in two directions, the same as the seed was sown, when the frost has been out of the ground long enough for it to have dried out somewhat. This will press all the roots firmly down after the heaving action of freezing and thawing that has gone on all winter; it also

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smooths its surface, and helps maintain even grades.

The use of even well rotted manure on lawns is attended by such a pestilential outbreak of weeds in the spring that it is not advised. One application will ruin an established lawn. Bone meal is better, or some one of the special lawn fertilizers. These are scattered in the same way as seed; from 300 to 500 pounds of the former should be used for 100 x 100 feet. Shaded areas under trees will require more fertilizing than exposed and open places.

Neglected lawns may be renovated by raking over with a steel rake until the soil is loosened, then seeding with about one-half the amount of seed used when sowing new. But where weeds have really gained the upper hand it is better to plow the entire surface up and start new. Many old dooryards can be brought out of their unkempt and hopeless condition, however, without a resort to any such heroic measure, by going at them early in the spring, reseeding, mowing whenever needed, and giving them general careful attention.

XVI

BULBS

BULBS are one of the wonderful adaptations to adverse conditions—to conditions which would kill vegetation completely if vegetation did not adjust itself to meet them—which are constantly to be met in Nature. They are really a plant reduced to the minimum—to the most consolidated form possible—to the sphere, or to an approach to the sphere. This is the form exposing the least possible surface; and that surface, in a bulb, is usually well protected.

Botanically there is a great difference in bulbs, and these differences—most of them—are perfectly apparent even to the layman. For example, there is the potato and the onion: both are bulbs in the generally accepted sense of the term, yet one is a solid body and the other is made up of scales which wrap around each other. Strictly speaking however, only the latter form is a true bulb; the other forms are known as rhizomes, tubers or corms, according as they are creeping rootstocks, thickened, succulent bodies, or solid, like the “root” of a crocus.

There is no class of plants which will produce such

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results as bulbs; and produce results so certainly and satisfactorily with so little labor devoted to them, and so little knowledge of plant culture guiding the planter. They furnish not only the early glory of the spring but much more besides; indeed they alone might be depended upon to make a flower garden, if other things were not available.

Of all forms of plant life they are the most easily transported from one part of the world to another, being to all appearances dead things when they have matured and are ready for their long rest. They reach this stage usually about midsummer, in the temperate parts of the world, and all large dealers therefore issue special summer or early autumn catalogues, listing only bulbs, so varied are they and so important the position which they occupy.

Unless otherwise specified, bulbs should be planted in October or November, the idea being to give them time to make good root growth *but not to p growth*, before freezing weather puts them to sleep again. They may be set out later than November however, if the ground is not frozen.

They require usually a fairly good soil, but above all else they demand that it shall be well drained. Without good drainage they simply will not succeed, and there is no use in trying to make them. It is a waste of time and energy—and money. The soddenness of heavy soils may be overcome however by putting a quantity of sand or sifted coal ashes under each bulb as it is planted, making this cushion deeper according

BULBS

as the quality of the soil seems to make it necessary to be extraordinarily careful about the drainage.

No manure ought ever to come in contact with bulbs, for it burns and kills them. Some say that well rotted manure is safe to use, but it is not easy to be sure that it is well enough rotted to be harmless, hence the only really safe way is to eliminate it from their actual presence. It may be worked into the soil where they are to go, *well in advance of their planting*, but even then it is wise to keep it from touching them. Bone meal is safer to use and has the advantage of being easier to incorporate evenly with the earth.

Do not set bulbs too deep. From an inch to four inches beneath the surface is all that they ought ever to go, according to their size. An earth covering that is one and a half times the bulb's own depth is the right distance. After the ground has frozen hard mulch it above them with four inches of leaves or litter, to keep it from thawing and freezing alternately during the changes of the winter. Take this mulch off however, very early in the spring—early in March in ordinary seasons—so that the tops will not start prematurely and be nipped by late frosts.

Bulbs that may be left where they are planted are the only really satisfactory ones to grow, and certainly the only kind that the beginner ought ever to attempt. But if they must be moved for any reason, always remember that it must be done only when they are dormant—and the signal of their having reached this state, of their having matured or “ripened,” is the dying

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down and drying out of their leaves. Never cut the leaves away, by-the-way, however badly they may offend the fastidious eye, for they are necessary to the bulb's maturing. Let them die and shrivel up and dry away of themselves. Other things should grow in the borders with bulbous plants to hide this unsightly period.

Usually a better effect is produced with a quantity of any one kind of bulb than with single plants, though there are some things, notably Iris, that are luxuriant enough in habit to be used in solitary clumps. Crocuses, Daffodils, Snowdrops, Hyacinths, Narcissi, Tulips, Lilies and Iris are probably the most familiar bulb plants, and the ones most commonly planted. No planting is really complete however that does not include, in addition to these, the heavenly b'ue and dainty Squills, the old evil-smelling but stately Crown Imperials, and the Wood lily or "Wake-robin." And there are also Star of Bethlehem and Dog's-tooth violet which ought to be everywhere.

Of all these the Snowdrops and the Squills are the only ones that will actually bear naturalizing *in close cut lawns*, notwithstanding the fact that Crocuses are so often recommended for this purpose and so frequently planted. The frequent mowing of a lawn is too much for them, and though they may survive for some time, they will not hold their own but will eventually die out. The Squills and the Snowdrops however, do not seem to mind in the least—they are earlier than the Crocus in many places anyway—and not only maintain themselves but multiply and spread, in spite of the lawn-



There is no class of plants that will produce such consistently satisfactory results as bulbs. The most important consideration is a well drained location



Under large trees where it is difficult to grow grass, try this scheme of planting Crocuses and Myrtle. The latter will hide the dying bulb foliage after the Crocuses have bloomed

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mower. Snowdrops must be in partial shade, owing to the sensitiveness of their bulbs to the burning heat of the summer sun on the ground above them. It bakes them to such a degree that they cannot endure it, but are fairly consumed.

All of the bulbs listed in the planting table which follows are hardy, and consequently require no more care after being planted than the general directions specify. But a word about the storing of bulbs in winter may not be amiss, for many gardeners, even beginners, are willing to take the trouble which tender bulbs make necessary for the sake of the flowers which they produce. Everyone loves Dahlias, for example, and indeed well they may, for their flowers come at a season when flowers are most welcome, they produce them freely, and they last a long time.

Solid bulbs are less troublesome to keep than the scaly ones, though the latter are no very great bother. But they do require to be kept from the air, or at least from too much air; it dries and shrivels them, and once dried and shrivelled, their vitality is sapped beyond a season's repair, if not beyond repair altogether. No bulbs should ever be packed away from the air entirely, however, not even these; a number of things may happen if they are. They may rot, or they may start to grow, or they may mold or sweat—and all of these are very bad, of course.

All hardy bulbs should be stored in a cellar or room where there is fresh air, and the average winter temperature is about 40° F. Put the solid bulbs—the

potato-like bulbs—away from the light in a basket or a shallow box with a piece of wire screening for the bottom. Bury the scaly bulbs in leaf mold or moist sand in boxes without covers. Rhizomes and thickened-root forms may be kept in the same way, in sand, sphagnum moss or leaf mold. Be sure that the temperature does not run higher than the stipulated degrees: it may better go lower, if anything. Warmth, even a little of it, is likely to start hardy bulbs into growth prematurely.

Tender bulbs require at least ten degrees more warmth than the highest temperature suitable for the hardy fellows—that is, a temperature of at least 50° F. The solid bulbs of this division, after drying for a month, should be kept buried in *dry* sand or ashes; the scaly or coated bulbs, and the rhizome forms, may be shaken free of earth and wrapped in paper or put into paper bags, tied up, and hung up where it is dry and uniformly of the required even warmth. Look out for mice, for they have a great taste for this form of vegetable during the winter months.

Kept properly, bulbs may remain out of the ground for many months without injury, but no bulb should ever be permitted to stay out of its natural element a moment longer than the season demands. The place for them is in the dirt: even when they are dormant, they are better off there, if it is possible to leave them there. The only reason for not doing so is the susceptibility of the foreigners to our rigorous climate.

Bulbs of full size only are worth buying. Seconds

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cannot produce anything but second-class plants, for the reason that they are not fully matured when they are dug, hence have had to be graded as "seconds" or small size. There are still lower gradations, but they are not worth considering at all, unless one is willing to wait several years. For naturalizing on a large scale they may do, but even for this it is better not to take anything lower than a second.

Some bulbous plants require as many as six years to arrive at their full maturity. Naturally bulbs that have been cared for this length of time by the grower are not the cheapest to the purchaser: which is only another way of saying that good bulbs are sometimes seemingly expensive. But their cost is not so great as it seems, for they give results, as already pointed out, proportionately greater than any other kind of flower, with less trouble and care,—especially the hardy kinds. So it is real economy after all, to buy the largest size, and the best bulbs obtainable, from the best dealer.

Hardy Bulb Planting Table

NAME	PLANT BULBS IN	SOIL	BLOOM	REMARKS	USUALLY DORMANT
Galanthus Elwesii " nivalis (snowdrops)	September or October	Ordinary Ordinary	Feb., March March	Naturalize by 100 or 1000 in lawn, amongst shrubbery, where there will be summer shade; or plant in shady beds or border; leave undisturbed for years.	August to November.
Crocus, in variety	September	Ordinary	Feb., April	Set 2 inches apart along edge of border, or plant in groups.	August to October.
Chionodoxa Luciliae (glory-of-the-snow)	September	Ordinary	March	Plant in clumps of from 25 up, 1 inch apart, and thin and re-plant about every three years.	August to October.
Fritillaria imperialis (crown imperial)	September	Ordinary	March	Clumps of 3 to 6; do not cut off flower stalks, but let them die down of themselves.	August to October.
Scilla Sibirica " campanulata (Siberian squills)	September or October	Ordinary Ordinary	March March	Groups, as edging, or naturalized by 100 or 1000 on lawn.	August to November.
Puschkinia Libanotica (striped squill)	September	Ordinary	March	Plant in clumps in border, or in bays of shrubbery.	August to October.
Erythronium Hartwegii (dog's-tooth violet)	October	Light	April	Plant in clusters in partial shade.	August to November.
Narcissus pseudo-narcissus (daffodils)	September	Stiff preferred	April	Clumps in border or in natural masses among shrubs or anywhere where grass is not cut with a lawn-mower.	August to October.
Narcissus jonquilla (jonquills)	September	Any ordinary	April	Very fragrant; all forms are good.	August to October.

NAME	PLANT BULBS IN	SOIL	BLOOM	REMARKS	USUALLY DORMANT
<i>Narcissus poeticus</i> (poet's Narcissus)	September	Heavy preferred	Late April	Naturalize in meadow grass, or plant in border or in clumps, anywhere.	August to October.
<i>Trillium grandiflorum</i> (wood lily, wake-robin)	November (or in spring)	Deep, moist	April-May	Set tubers <i>vertically</i> , under 1½ inches of earth; plant in colonies, in part shade.	October to March.
<i>Hyacinths</i> , in variety	October	Light	April-May	Set the bulbs under 3 inches of earth and 6 inches apart, in border.	August to November.
<i>Tulips</i> , in variety	October	Ordinary	April-May	Set bulbs under 2 inches of earth, 5 inches apart, in border.	August to November.
<i>Convallaria majalis</i> (lily-of-the-valley)	November	Ordinary	May	Give partial shade; thin and replant every four years; in border or naturalized among trees or shrubs.	October to April.
<i>Iris</i> , in variety (two forms of bulbs)	Last of October	Ordinary	May-June	In clumps anywhere, or naturalized near water.	Bulbs, August to November. Rhizomes, October to April.
<i>Ornithogalum umbellatum</i> (star of Bethlehem)	October	Ordinary	May-June	There are finer, showier forms, well known in England, but hard to get at present, here.	August to November.
<i>Anthericum</i> (St. Bernard's lily or St. Bruno's lily)	October	Ordinary	May-June	Clumps of 6 or more in border; mulch well in winter.	September to April.
<i>Hemerocallis</i> , in variety (day lily, lemon lily)	Late October or November	Ordinary	June to Sept.	There are four varieties which will extend the season of bloom throughout the summer.	October to April.
<i>Sternbergia lutea</i> (autumn daffodil)	November	Heavy required	September	Same as crocus; must have a dry and sunny place; plant under 3 inches of earth.	October to April.

XVII

ALL KINDS OF GARDENS

THERE are five kinds of places in the world which offer difficulties in the way of gardening that the amateur is likely to feel are insurmountable. These are rocky ledges; wet, marshy spots; sand dunes or their equivalent; shady places; and a hillside so nearly vertical that even the earth hardly sticks to it. But nothing is insurmountable—there is something that will grow in every place in the world—except possibly on the perfectly bare face of a rock—never doubt that.

The reasons which account for failure in gardening therefore, are the same reasons that account for failure in other undertakings—lack of study of conditions, and failure to adapt our endeavors to them, after they are studied—to those, at least, which are unalterable. For certain natural conditions are unalterable, in the main. Springs cannot be dried up, nor rivers turned from their courses ordinarily; the sandy earth which has, in some long gone age, been the bed of the sea, cannot be transformed into the rich loam of river bottom-lands; stern, rock-ribbed mountain-sides cannot be dissolved into the softness of smiling fields. These, and some other things, we cannot change.

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But we can learn to adapt ourselves and our endeavors to the conditions which they afford—these conditions which we must accept. There is no reason for giving up just because everything does not happen to be favorable to the garden things which are most common, hence most familiar.

After all, the things that are really familiar are a comparatively small number, considering that the average dealer's catalogue may list from five hundred to six hundred species. And each of these is probably offered in not less than three varieties and several are offered in many more than that number. This means not less than fifteen hundred plants, at the lowest figure; hence it is easy to see that a liberal estimate of the proportion that may be called "familiar" to most persons will fix the number at not more than ten per cent of the total—otherwise from one hundred and fifty kinds up. On the basis of this estimate therefore, there are still remaining thirteen hundred and fifty varieties, representing four hundred and fifty species, to become acquainted with. Out of these be sure there are many lovely, unheard-of things that will grow in the seemingly impossible places.

So after all there may be as many kinds of garden as there are kinds of places—instead of just a "hardy" garden and an "old-fashioned" garden. But note that these several kinds, natives of unusual places, should be only adopted *where natural conditions force the choice* of them; these plants will not thrive in ordinary garden soil and conditions any better than the plants from the

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ordinary garden will thrive in the unusual conditions which special places present. The "rockeries" which men make ordinarily—those monstrosities of piled-up stones, gracing (?) a corner or the center of a lawn—are no more suitable for the growth of naturally rock-loving plants than the heart of the woods is suitable for growing green corn. Think how unhappy the wild, free, shy things from the mountain must be in such a spot—as bad as the animals in a zoo! You do not believe that plants can be unhappy? Well—I do.

Rockeries—or preferably, rock gardens—should be of necessity, not of choice. Where the only space available for gardening is boulder land, sparsely covered with earth in places—in crannies and pockets and depressions—and altogether bare in places, where trees cling by long, strong roots that clutch at the stone, finding every cranny and pocket and working their tenacious way into it, there is the place for a rock garden—there *is* a rock garden, willy-nilly. Or where a bed of stones—round stones and odd shaped, of varying sizes—mark the course of some long-forgotten stream, here again is a rock garden—of a different character to be sure, but nevertheless a rock garden and nothing else.

Ground that is like a sponge, oozing water at every step, from springs that rise beneath it, is so difficult to imitate that artificial "boggeries" (thank fortune!) are unknown. And usually such ground is avoided by all those who have a choice given them—but some there be who have it thrust upon them. These are rather discouraged mortals—and small wonder if they have



Utilizing natural resources is one great secret of garden success. If you have rocky land, plant it with rock-loving plants



Few things add so much charm to a garden as a water feature. Even if you cannot secure the needed water pressure for a fountain you can build a cement pool that is easily kept filled by rains or by an occasional use of the hose

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not mastered the situation by finding the key, some way, somehow.

Nothing will grow there but the things that like it—that is the key; and these will flourish mightily—that is the reward. Make walks through such a garden of large, flat stepping-stones, laid on a bed of small stones, if they seem likely to sink below the requisite level without some support.

The deserts of our great southwest furnish a species of plants which blossom like the rose, and which, having learned through ages of life there to love the hot sun and the hot dry sand, afford garden material for hopelessly sandy regions. These are the cacti—strange, ungracious in form, looking often more like some queer animals than like plants, yet bearing flowers of wonderful beauty and often of enormous size. Commonly they are grown only as house-plants, but there are several hardy kinds which will endure northern winters, even though they are heat lovers. An outdoor collection of these, well arranged, will furnish an interesting and beautiful garden on practically clear sand.

The steep barren hillsides where plants wash out as fast as they are planted, may be conquered by breaking them into terraces, held either by walls or by some strong, fibrous-rooted and root-spreading plant which, carpeting their slope, holds the earth firmly in spite of the wash of rains.

The ordinary hardy garden, on ordinary garden soil, presents no special problem to the beginner—but it does try his patience most woefully. Waiting for

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results is probably the hardest thing that the inexperienced have to contend with. Those who do not know from actual experience in gardening the time it takes to get results equal to the vision of the mind's eye, have usually an unhappy season finding out.

But, for the comfort of these, there is the "hurry-up" garden, to tide them over. Let none be persuaded to regard annuals as more than this however, else each year's spring will find them just where they were the year before—and the "mind's-eye visions" will never come true. As a make-shift for first years however—and after that as incidents, scattered here and there among other things where spaces need filling temporarily—annuals are a godsend. They have the advantage too, of being easier to raise from seed, ordinarily, than the long-lived but slow growing perennials. Thus they are excellent material for a beginning.

The perennials given in the list appended however, may all be raised from seed, and are not difficult to deal with. The time for sowing has not been given because all perennials require practically the same treatment and should be planted at the same time. They devote a year's time usually to becoming established—to their own growth—before they undertake to reproduce themselves. Therefore they do not blossom ordinarily until the second year, no matter how early the seed may be put in the ground in the spring. But there are some exceptions to this: these are marked with an asterisk in the margin, and may be treated as if they were annuals—that is, they may be sown after all danger of frost is

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past, out-of-doors where they to grow, and the seedlings thinned out, after they are up enough to be recognizable, to the required number per square foot.

For the others the best way is to sow them in a bed that is not exposed to full sun—if it is it will be necessary to make a screen of lath nailed to a frame the size of the bed, having four legs or uprights to stand on, that can be put over the bed during the daytime. This is simple enough and insures always the same degree of the sun. The surface of a seed bed should be raised four inches above the level of the ground; and it should have a fine soft, mellow soil spread over it to receive the seeds.

After everything is ready, sprinkle the bed thoroughly, put the screen over it, and leave it until the next day. Then draw shallow rows across it for the seeds—these rows need not be more than three inches apart, or even two, if space is at a premium—put them in as thick as the directions on each particular packet specify, cover them gently—by simply pressing the entire surface of the bed down with the float—with what seems to be three times their depth of earth, unless the directions give a definite depth—water them in with a fine sprayer, sprinkle the bed all over with a thin “dusting” of fine dry soil, and put the screen on if the sun shines. Take it off at night, unless there is beating rain in progress or in sight.

Keep the bed evenly moistened the same as directed for a flat; thin out the seedlings until they stand two inches apart, which gives them room to grow stiff and stocky—and transplant them to their permanent quarters

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when they are three inches high. Observe all that has been said about transplanting when the time for this operation arrives.

The months of July and August are probably the best in which to raise seedlings of perennials out-of-doors, though they may of course be started in the spring if one wishes, just as other plants are started. There will be no gain in time of bloom however, for the July or August plants will bloom the second year quite as well as the earlier ones.

I Ten Plants for Rocky Places—(Perennials)

NAME	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
<i>Arenaria verna</i> , Cæspitosa (sandwort)	4 inches	4 inches	April, May	White	Plant at edge of rocks or in crevices.
<i>Veronica rupestris</i> (speedwell)	3 to 4 inches	4 inches	May, June	Bright blue	Spreads in a thick mat.
<i>Silene Shafta</i> (autumn catch-fly)	4 to 6 inches	5 inches	July on	Pink	Plant at edge of rocks.
<i>Saxifraga umbrosa</i> ("London pride," Nancy Pretty)	6 to 12 inches	8 inches	July on	White, tinged with red	Low growing, but flower stems a foot high.
<i>Linaria hepaticæfolia</i> (toad flax)	2 to 3 inches	8 inches	June on	Lilac	Dense carpet of foliage, dark green; very floriferous.
<i>Phlox subulata</i> (creeping phlox)	3 to 6 inches	8 inches	April, May	White, pink, maroon	The pink is the best; creeps around and almost over rocks; spreads gradually.
<i>Geranium sanguineum</i> (crane's bill)	18 inches	10 inches	May to July	White, scarlet	Varieties of each color; use in large masses.
<i>Hepatica angulosa</i> (liverwort)	4 to 6 inches	6 inches	April, May	White, red, purple	Likes shady places among rocks; use in clumps.
<i>Aquilegia cœrulea</i> (Rocky mountain Columbine)	2 to 3 feet	15 inches	May and June	White and bright blue	Use in quantity.
<i>Sedum Aizoon</i> (stonecrop)	18 inches	8 inches	June to August	Yellow	Use in masses anywhere among rocks.

Ten Plants for Wet Places—(Perennials)

NAME	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
<i>Acorus calamus</i> (sweet flag)	2 feet	12 inches	Flowers inconspicuous		Foliage striped yellow in spring; root-stock aromatic; plant in large clumps.
<i>Caltha palustris</i> (marsh marigold)	18 inches	10 inches	April to June	Bright yellow	Used as "cowslip greens" before blossoming; plant in masses; lights up wet places beautifully.
<i>Iris pseudacorus</i> (yellow iris)	2 to 3 feet	20 inches	May and June	Yellow	Plant in large masses or clumps, in natural fashion when possible.
<i>Lobelia cardinalis</i> (cardinal flower)	2 to 4 feet	20 inches	August	Scarlet	Plant in border or in masses among and before shrubbery.
<i>Hibiscus Moscheutos</i> (swamp mallow, marsh mallow)	5 to 6 feet	2 feet	August and September	Pink	Plant in borders or masses or long hedge-like lines.
<i>Sarracenia purpurea</i> (pitcher plant, side-saddle flower)	18 inches	4 inches	June	Deep purple	Very wet, places; curious leaves standing up straight; grows naturally in almost inaccessible bogs.
<i>Veratrum viride</i> (Indian poke, false hellebore)	2 to 7 feet	2 feet	July	Yellowish-green	Lush, broad leaves; plant in clumps.
<i>Tradescantia Virginiana</i> (spiderwort)	2 feet	12 inches	May to August	Purple	Plant among shrubbery or along woodland walks where it is moist.
<i>Chelone Lyoni</i> (turtle head)	2 feet	10 inches	August and September	Deep red	Likes half-shade; use in clumps in the border.
<i>Lythrum salicaria</i> (spiked loosestrife)	3 feet	18 inches	July and August	Rose colored	Use in masses anywhere.

Ten Plants for Dry, Arid Places—(Perennials)

(Cacti are not included)

NAME	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
<i>Achillea tomentosa</i> (woolly yarrow)	1 foot	8 inches	June	Yellow	Plant in masses in border, or in clumps.
<i>Asclepias tuberosa</i> (butterfly-weed)	2 to 3 feet	18 inches	July and August	Orange	Very striking; flowers last well when cut; plant in clumps.
<i>Cerastium tomentosum</i> (snow-in-summer)	6 inches	6 inches	May and June	White	Silvery foliage, making a snowy carpet; in masses or for edging.
<i>Liatis spicata</i> (button snakeroot)	3 feet	18 inches	July, into September	Purple	Spikes of blossom a foot or more long; use in masses back in border.
<i>Sedum sexangulare</i> (live-forever)	5 inches	6 inches	June and July	Yellow	Foliage dark green and fine; makes a dense carpet anywhere.
<i>Aster ericoides</i> (native wild aster)	2½ feet	15 inches	August and September	Blue	Small flowers in great numbers; use in masses before shrubby or along border.
<i>Pachysandra terminalis</i> (mountain spurge)	6 inches	6 inches	May	Whitish	Trailing, with glossy, evergreen foliage.
<i>Lychnis coronaria</i> (mullein pink, rose campion)	2 feet	12 inches	June, into July	Crimson	Plant in masses or in clumps in the border.
<i>Rosa lucida</i> (native rose)	6 feet	30 inches	June and July	Pink	May be planted 1 foot apart and kept down to 18 inches in height, when desired; use in masses for border, or as shrubby mass.
<i>Yucca filamentosa</i> (Adam's needle)	4 to 5 feet	18 inches	June	Cream white	Low-growing bayonet-like leaves; flower spikes rising high above them; plant in clumps or in long rows before shrubbery; unsightly after blooming.

IV

Ten Plants for Shady Places—(Perennials)

NAME	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
<i>Aconitum</i> , in variety (monkshood)	2 to 5 feet	12 to 24 inches	July to frost	Blue	These are poisonous and should never be used where there are children who may eat the berries; plant in masses.
<i>Aquilegia Canadensis</i> (native Columbine)	18 ins. to 2 ft.	12 inches	May to July	Orange and scarlet	The common Columbine; use in masses of from six plants up to any number.
<i>Digitalis purpurea</i> (foxglove)	3 feet	15 inches	June and July	Various	Rows at back of border, or masses anywhere; fine among shrubbery.
<i>Dodecatheon Meadia</i> (shooting star)	10 inches	6 inches	May and June	Purple-rose	Unusual in form of flower; plant in masses at the front of border.
<i>Funkia</i> , in variety (plantain lily)	18 ins. to 2 ft.	12 inches	July, into Aug.	White to lilao	The foliage of these makes them especially fine for edging a border; use in clumps anywhere.
<i>Monarda</i> , in variety (bee balm, Oswego tea)	2 to 3 feet	12 to 15 inches	July and Aug.	Scarlet	Brilliant against dark foliage masses or anywhere in shade; use in clumps.
<i>Sedum spectabile</i> (stonecrop)	18 inches	10 inches	Aug. and Sept.	Pink	Good for foliage as well as flowers; mass in the border (r use anywhere.
<i>Smilacina racemosa</i> (false Solomon's seal)	3 feet	10 inches	May	White	Long, wand-like branches, fine foliage; use in masses in the border or naturalize among tall trees or shrubbery.
<i>Thalictrum aquilegifolium</i> (meadow rue)	3 feet	15 inches	May to July	White	Mass in the border or naturalize among shrubs or tall-growing trees.
<i>Trillium grandiflorum</i> (wood lily, wake-robin)	12 inches	6 inches	May	White	Use in colonies of six and up; naturalize or plant in border.

V

Plants for Soil Binding on Slopes (Perennial)

NAME	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
<i>Lonicera Japonica</i> (pink woodbine, evergreen honeysuckle)	3 feet	June to August	Pinkish white	Pin branches to ground and cover at intervals with a little earth; will root and gradually cover a surface with dense, tight growth.
<i>Vinca minor</i> (periwinkle)	3 feet	May	Blue, white or rose	Stems will creep out and root of themselves without covering with earth.
<i>Xanthorrhiza apifolia</i> (yellow root)	2 feet	Not planted for flower		Shrubby in growth, spreading by roots whence strong suckers rise in spring.

Ten Fragrant Flowering Plants

NAME	REQUIREMENTS	SOW		HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
		Indoors	Outdoors					
<i>Matthiola bicornis</i> (evening scented stocks)	No special		May	6 inches	6 inches	July on	Blue, inconspicuous	No special beauty in flowers, but very fragrant. Annual.
<i>Nicotinia affinis</i> (tuberose-flowered tobacco)	No special		May	2 to 3 feet	18 to 24 inches	July on	White	Plant in clumps in border or anywhere. Annual.
<i>Matthiola incana</i> , annua (gillyflower, ten-week stocks)	Any rich soil	March	May	18 inches	12 inches	July to frost	Various	Masses in border. Annual.
<i>Asperula azurea setosa</i> (sweet woodruff)	Any soil, part shade		May	9 inches	6 inches	July on	Lavender-blue	Foliage fragrant; fine edging plant. Annual.
<i>Dianthus</i> in variety (clove pink)	Rich soil	February	April	10 to 15 inches	8 inches	June on	Various	Get "Marguerite" strain; use in long borders. Annual.
<i>Reseda</i> , in variety (Mignonette)	No special	April	July	12 inches	10 inches	June on	Yellowish-green	Two sowings for succession of bloom; clumps or masses. Annual.
<i>Heliotropium Peruvianum</i> (cherry pie, heliotrope)	Light, rich soil, plenty of water	April		12 inches	8 inches	June on	Purple	In clumps or long borders, or masses in border. Annual.

NAME	REQUIREMENTS	Sow		HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR OF FLOWER	REMARKS
		Indoors	Outdoors					
<i>Hesperis matronalis</i> (dame's rocket)	No special		September	2 to 3 feet	15 to 20 inches	June to August	White, lilac, purple	In masses along border, or among shrubbery. Perennial.
<i>Primula veris</i> (cowslip)	No special		September	6 inches	4 inches	April	Yellow	Use in masses anywhere. Perennial.
<i>Lavendula vera</i> (sweet lavender)	Light, dry soil		September	3 feet	12 inches	July and August	Lavender	May be used as a hedge or in clumps. Perennial, but must be covered with leaves in winter.

Twenty Best Annuals

NAME	REQUIREMENTS	Sow		HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR	REMARKS
		Indoors	Outdoors					
Antirrhinum, in variety (snapdragon)	Light soil, sunny position		September or May	18 inches	10 inches	June, or July-Aug.	Various	Masses in border or anywhere; autumn sowing gives early bloom.
Ageratum, in variety (floss-flower)	No special	March	May 1	4 to 12 inches	4 to 6 inches	June to frost	Blue, white	Use in masses; especially good for edgings.
Arctotis grandis (African daisy)	Very sunny place	March	May	2 to 3 feet	18 inches	July to frost	White	Use in masses; fine for cut flowers.
Aster, in variety (China aster)	Rich, heavy loam, full sun	April	May 1	12 to 30 inches	18 inches	July to frost	Various	Masses; change location each year.
Calendula, in variety (pot Marigold)	No special		May 1	12 inches	8 to 10 inches	Late June to frost	Ivory, yellow	Masses in border or as an edging.
Centaurea, in variety (cornflower, bachelor's button)	Thin soil, full sun		May	12 to 24 inches	8 to 15 inches	July	Blue, white, red	Masses; persists because it self-sows.
Cosmos, in variety	Light, sandy, poor soil, full sun	February	April	To 5 feet	18 inches	July to frost	Various	Pinch out tops when half-grown to induce earlier flowers; masses.
Delphinium Ajacis, in variety (annual larkspur)	No special		September or May	3 feet	20 inches	July on	Various	Masses in border or among shrubbery; autumn for early bloom.
Escholtzia Californica (California poppy)	No special		September or April	12 inches	4 to 6 inches	June to frost	White, yellow, red	Masses; autumn sown seed for early flowers.

NAME	REQUIREMENTS	SOW		HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR	REMARKS
		Indoors	Outdoors					
<i>Gypsophila muralis</i> (baby's breath)	Any soil, full sun		April, May, June	10 inches	6 to 8 inches	June on	Various	Successive sowings for successive bloom; the pink is fine for edging.
<i>Helichrysum monstrosum</i> (straw flower)	Rich soil, sun		May	2 feet	12 inches	July on	Various	Everlastings; in clumps here and there.
<i>Lavatera trimestris</i> (annual mallow)	No special		May	2 feet	12 inches	July on	Shrimp pink	Clumps, in border or against shrubbery.
<i>Matricaria Capensis</i> (feverfew)	No special		May	18 inches	10 inches	July to frost	White	Clumps; good also indoors in winter.
<i>Nasturtium</i> , in variety	Sun and good drainage		May 1	Climbing and dwarf	8 inches	July to frost	Yellows, reds	Borders, or drooping over walls or railings.
<i>Petunia</i> , in variety	Good soil, full sun	April	May	18 inches	12 inches	July on	Various	Masses; the weakest seedlings produce finest flowers; self-sows.
<i>Portulaca</i> , in variety	Poor, sandy soil, full sun		Late May	6 inches	10 inches	July on	Various	Carpet growth under tall plants or over arid spots; use in single colors, as reds sometimes clash.
<i>Salpiglossis</i> , in variety (painted tongue)	Deep, light, rich loam	March	May 1	18 inches	12 inches	July on	Various	Masses; "Emperor" is a particularly fine variety.
<i>Scabiosa</i> , in variety (mourning bride, sweet scabious, etc.)	No special		May	2 feet	12 inches	Early July	Various	Borders and masses; fine for cut flowers.
<i>Salvia splendens</i> (salvia, scarlet sage)	No special		May	3 feet	12 inches	July to frost	Scarlet	In borders, clumps or as boundary edging.
<i>Zinnia</i> , in variety (youth-and-old-age)	Ordinary soil	March	May 1	2 feet	12 inches	July on	Various	Groups, borders, hedge effects, and massed against shrubbery.

Twenty Best Perennials

NAME	REQUIREMENTS	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR	REMARKS
Althea rosea, in variety (hollyhock)	No special	4 feet	18 inches	July and August	Various	Massed at back of border, against walls or hedges.
Adonis vernalis (ox eye)	Light, moist soil, sun or part shade	12 inches	8 inches	April	Yellow	In groups; good for rocky places.
*Achillea ptarmica, fl. pl. (milfoil, yarrow)	No special	18 inches	10 inches	May to frost	White	In clumps, borders or masses anywhere.
Aquilegia, in variety (Columbine)	No special	18 inches	10 inches	May and June	Various	Borders or masses anywhere; fine, airy, graceful foliage.
Boltonia, in variety (false chamomile)	No special	4 to 6 feet	2 feet	July to September	White, lilac-pink	Shrubby; use against shrub border, singly or in masses; clumps anywhere.
Campanula, in variety (Canterbury bell, bell-flower)	Light, rich soil	6 inches to 2½ feet	6 to 15 inches	May on	White, pink, blue	Different varieties extend bloom over season and give different heights; masses.
Chrysanthemum, pompon (hardy chrysanthemum)	Ordinary soil	2 to 2½ feet	18 inches	September on to hard frost	White and various	Masses among shrubbery or in borders anywhere.
Digitalis, in variety (foxglove)	Ordinary soil	3 to 5 feet	18 inches	June and July	Various	Masses or naturalized against shrubbery.
Delphinium, in variety (larkspur) *var. Chinoense	Deep, rich soil	4 to 6 feet	18 to 24 inches	June to August	White, blue, rose	Clumps at back of border or among shrubbery.
*Eupatorium (thoroughwort)	No special	3 to 4 feet	18 inches	August on	White, blue	Naturalized anywhere, or in masses in border.

* Treat as annuals.

NAME	REQUIREMENTS	HEIGHT	DISTANCE APART	TIME OF FLOWERING	COLOR	REMARKS
<i>Dianthus barbatus</i> (sweet William)	No special	20 inches	8 inches	June, July	White, reds	Borders, long lines or masses anywhere.
* <i>Gaillardia</i> , in variety (blanket flower)	No special	24 inches	12 inches	July to frost	Yellows, crimson	Masses in border.
<i>Helenium</i> , in variety (saeze wort)	No special	5 to 6 feet	24 inches	August on	Yellows	Masses at back of border.
<i>Heuchera sanguinea</i> (alum root, coral bells)	Ordinary soil	12 inches	8 inches	July on	Coral reds	Masses in border.
<i>Lupinus polyphyllus</i> , in variety (lupine)	Rich loam; dislikes lime	2 to 5 feet	12 to 24 inches	June to September	White, rose, blue	Masses in border; do not transplant after they are once settled; best to sow them where they are to grow.
* <i>Myosotis palustris</i> (forget-me-not)	Moist half-shade, or full sun if not dry	6 to 8 inches	6 inches	May and June	Blue	In masses, as ground cover, or edging. Protect a little with leaves during winter.
<i>Phlox decussata</i> (phlox)	Good soil	3 feet	15 inches	June and July	Various	Masses, in border.
* <i>Papaver nudicaule</i> (Iceland poppy)	No special	12 inches	8 inches	May on, if picked	Various	Masses anywhere; do not let seed form, as they stop blooming when allowed to seed; sow where they are to grow.
<i>Pyrethrum</i> , in variety	No special	2 to 4 feet	12 to 18 inches	May, June and again in Sept.	Various	Masses.
<i>Saponaria</i> (bouncing Bet)	No special	15 inches	8 inches	June on	Rosy white	Masses in border or anywhere.

* Treat as annuals.

XVIII

THE HOTBED AND THE COLDFRAME

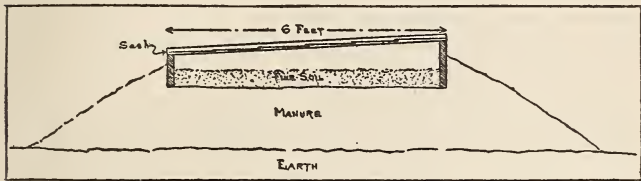
EVERY garden beginner is eager to begin at once—to have things growing as soon as possible—and so, because a hotbed will advance the season anywhere from eight to ten weeks, he will of course wish to make one, when the time comes. They are simple enough to build, so there is no reason why he should not follow the directions—that is all. They are simple enough to run, too—follow the directions again; and no garden can be regarded as completely equipped until it has one.

A hotbed is really a forcing house on a very small scale—a place where plants may be grown in advance of the open season by means of heat artificially supplied to them. This heat may be carried underneath the bed by steam or hot water pipes—but that is the bothersome and expensive way—or it may be furnished by placing the bed upon a mound of fermenting manure. This is the easiest and usual way, and the only one that need concern the beginner.

Fresh manure from the stables of grain-fed horses, mixed with one-third bedding straw (this latter lengthens the heating period), should first be piled in

THE HOTBED AND THE COLDFRAME

the protected spot chosen for the bed's location—a place where the north winds cannot reach. If the manure is dry, sprinkle it with tepid water to start decomposition.



Cross-section diagram of a Hotbed.

Steam will begin to rise from the pile in from three to five days. As soon as it appears have it well worked over, turning the outside inside and bringing the inside to the surface—then let it alone to warm up again. This will take two or three days more—the presence of the steam will indicate that it is ready, when the work may proceed.

Spread the manure evenly over an area large enough to give a full two-foot margin all around outside the sash or sashes. Make it 18 inches deep—this for the latitude of New York City; have it proportionately deeper and broader in colder localities—and pack it firmly. On this flat pile set the frame to carry the sash.

This frame is a bottomless and topleless box made of two-inch planks; it should slope on top from a height of about 12 inches at the front to 18 or 24 inches at the back, with the sides slanted to conform to the slope. Its ground dimensions are regulated by the

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size of the sash it is to have as its top or covering—so, as a matter of fact, the first thing to do in making a hotbed is to get the sash.

Any old sash will do, whatever its shape or size. Glazed for a window, it will doubtless leak when put to this more trying use, but if it is reasonably tight the plants under it will not suffer. Lacking a discarded sash, regulation hotbed sash will, of course, be necessary, but these are inexpensive. They are glazed differently, however, from the ordinary window-sash—and the way of doing it ought to be among the gardener's accomplishments, for breakage is apt to occur.

The bars of these sash run lengthwise only, as you will see from the accompanying illustration, and are "rabbeted" to receive the glass. Spread soft putty along this rabbet, then, starting at the bottom of the sash, press the first pane down into the putty; fasten it with brads—the glazing points are not strong enough. Let the pane lap over the wood at the bottom rail half an inch, forming a watershed, and lap each succeeding pane over the preceding one by half an inch, in the way shingles are overlapped in roofing. A brad under each lower corner will keep the panes from slipping down.

With the hotbed placed upon the packed manure (the back or high end to the north always), proceed to bank up on the outside with more manure—quite up to the level of the lower or front edge. Then spread the soil, which is to be the actual seed bed, inside, making it from four to eight inches deep according to

THE HOTBED AND THE COLDFRAME

what you intend to grow. The shallower depth is quite sufficient for salad or for flower plants—only radishes and deeper growing root crops require the deeper bed. The planting soil of the hotbed should be rich and soft and friable—good garden earth with a mixture of sand is best.

Put the sash on the bed, and let it heat up the earth inside. It will be hot for three or four days—much too hot, at first, for any planting. Keep a thermometer inside the frame; do not begin planting until it drops to 90° F. or less.

As the plants must remain in the bed for two months it is necessary to thin out the seedlings as they grow, to make room. This should be done as soon as they appear in order to give the ones spared plenty of room to develop, right from the start. Some of the plants may later be transferred to the coldframe if it is too early for them to go out into the garden and the hotbed becomes overcrowded.

The hotbed should be watered with a sprinkler, keeping the soil just moist enough to crumble apart slowly after being squeezed in the hand, as described in the chapter on soil. Be sure that the sash is always in place after you have tended the bed—forgetting to replace it will result in plant tragedy. And be sure to ventilate the hotbed on warm days by raising the sash ever so little, or by slipping it down in the middle of the day,—between 11.30 and 1.30 o'clock, when the sun is shining directly on the glass.

Till the soil of the hotbed as you would anywhere

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in the garden—only do not keep the sash off for any length of time. Reach under to do the work. Nasty little green things that look like lice will probably appear—beastly, soft, smushy aphids they are. They revel in hotbeds, but a solution made of one-quarter pound of white soap dissolved in a little boiling water and then reduced in strength by adding five gallons of water, used tepid in a sprayer, will make short work of them. They will come again, no doubt—but vigilance will save the crop from their devastating armies. Fortunately they die easily—almost as easily as they come. They are often on the under side of leaves and unsuspected until the leaf curls—and then unseen because of their color. Keep a sharp watch for them. Other insect and fungous pests and how to get rid of them have had their own chapter.

A mat of straw or several thicknesses of burlap should be provided to cover the sash on cold nights—and it is seldom wise to build the bed before the last week of February or the early part of March. If ready by March 10th you will find it early enough for all practical purposes—and the plants in it will be big fellows by the time the ground is warm enough outside to receive them.

Unless the space it occupies is needed during the summer the bed may be left and used for a cold frame in the fall, for lettuce or other salad plants, or hardy annuals. The coldframe differs from the hotbed in that it is constructed without an underbed of heat producing materials. It is not used for forcing seeds into

THE HOTBED AND THE COLDFRAME

germination nor plants into premature growth, but only to provide protection from cold and wind for plants already growing—therefore it does not, of course, need heating.

The coldframe is a frame made exactly like the hotbed frame; but it is set on top of the ground instead of being sunk into it. It has the same protective sash as covering, and may be banked up a little on the outside with earth, to shut out water. Its usefulness makes it second only to the hotbed as a bit of garden equipment—indeed it supplements the work of the hotbed besides doing its own particular work, for it receives into its shelter the plants thinned out from the hotbed—plants that would otherwise be lost. Here they stay until the outdoors is warm enough to receive them.

Proof against cold the coldframe must be; this quality is its only excuse for being. Therefore it must be well and carefully constructed; its joints must be tight and not admit the shiftiest and most penetrating wind, and it should stand where trees or buildings give it their protection from the north.

By means of a coldframe, too, many plants may be “wintered over” that would otherwise perish utterly, and very young salad plants may be transplanted to it in the autumn from the garden, and furnish salad well into the winter—sometimes indeed all through it. Melons and cucumbers may be started in it in spring rather than in the hotbed; the hotbed forces them into too early growth and they require

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outdoor quarters long before it is safe to put them out, but the coldframe nurses them along deliberately so that when they can go out they are just about ready to. Thus a big gain is made, for instead of waiting for seed to germinate out-of-doors after the last frost has surely gone, the little plants are set out, already growing and vigorous.

XIX

GARDEN TOOLS

THE list of tools and appliances which are necessary to the comfort and convenience of the gardener-in-a-small-way, comprises sixteen or seventeen articles. A few more that are highly desirable bring the number up to twenty-two. If the space under cultivation is large enough to warrant the addition to these of a wheel hoe, by all means include it in the outfit. It will not do away with the need for the common hoe and rake and spade, for frequently they are indispensable; but it does lighten the labor of tilling the soil to an unbelievable degree.

It is useful too, even in a very small garden, if the vegetable rows have space enough at their ends to admit of turning around with it *outside* the garden limits. Where they run close up to a fence this is of course impossible; consequently the wheel hoe is not of much service in such restricted garden plots. But if land is not at a great premium it is worth while to leave a margin around a vegetable patch for just this purpose. The saving in labor—and fatigue—is worth the sacrifice in garden space, for the complete seeder, hoe, cultivator and plow of the wheel hoe make gardening only fun.

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The following are the things necessary, with or without the wheel hoe:

Pick.	Wheelbarrow.
Shovel (round point).	Spray Syringe (for liquid).
Spade (square).	Powder Gun.
Spading Fork.	Raffia (bunch).
Hoe (heart-shaped).	Stakes.
Rake (steel).	Labels (large and small)
Dibble.	Line.
Float.	Two 10-foot Measuring Poles.
Pruning Shears (French).	Lawn-mower.
Trowel.	Lawn Shears.
Hand Weeder.	Lawn Roller.

The pick may not be necessary in fine light soils, but where there is any deep digging, or transplanting of large shrubs or young trees to be done, it is a time, as well as patience, saver. The shovel, spade and spading fork each serve a purpose, according to the work in hand, the first being stronger and suitable to heavier work, especially to the digging up of anything, or the shifting of earth. The spade is for "spading" pure and simple—for turning over soil—and for cutting sod. It should not be used for hard digging. The spading fork is for turning over soil and breaking it up—pulverizing it—also for handling loose matter like dead leaves, manure and compost.

Good, old-fashioned garden tools are all of them pretty good, but the heart-shaped hoe is decidedly an improvement over the old broad-nosed common hoe, for it will do work that the latter will not, and all that it will besides. The pointed tip is a great advantage,

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working in where the square one cannot—and turned on its side it will draw up quite as good a “hill” with no more work.

The rake is a cultivator as well, indispensable for the surface tillage that is so essential to the garden's health and welfare. The dibble and the float have been described and their uses explained, in an earlier chapter. Pruning shears are required for snipping off even small branches, else the bark may be stripped. It is never well to try and pull or break even a twig from a branch, for some things have such tough bark that it will never yield, but will strip the length of a branch.

The trowel is for close-up hand work, likewise the hand weeder—both are needed among flowers especially. The liquid spray syringe and the powder gun are most important—indeed, almost everything else might be omitted, if one had to, but certainly not these. Raffia, which is soft yet tough, comes in great bunches, for tying up the things that need to be tied. Stakes are necessary for locating things as well as for supporting those plants which require it. Labels in the form of stakes are needed for the vegetable and flower garden, and smaller labels, to tie onto plants or to stick down into the flats or the beds where seeds are sown, made of wood so light that they will not weigh down a branch, are a necessity to the fastidious, helping to keep things neat and uniform, as they do. Any little stick will answer of course, if one feels that way, but smooth little labels are easily home-made.

Fifty feet of strong, hard-twisted line is none too

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much—a large garden will need to have two pieces this length—or one long piece if it is kept on a reel and taken proper care of. The measuring poles are very often of more use than line however, within short distances. There should be two, each ten feet long and each laid off in one foot spaces, plainly marked with a black line across them. For placing shrubbery according to a planting plan, or for placing any plants of which there are many to go in near together, they are of great help. The two are laid on the ground at right angles to each other, tips touching, embracing within their angle the space to be planted. Several plants can then be located “by eye,” taking the distance on each of them and placing a stake at the point of intersection of the lines (imaginary) running from the poles.

Lawn-mower and shears are acknowledged as necessities, but some may question the lawn roller. This is not necessary to be sure, if you know where you can borrow one; otherwise it certainly is, else the lawn cannot be properly cared for. After the freezing and heaving of winter there are always irregularities which only a heavy roller can smooth out; and these get worse by running the mower over them, so that the surface is soon utterly spoiled.

SOME GENERAL GARDEN TALK

THE person who is beginning to garden does not always want to begin at the actual beginning of gardening—obviously. Even though he is willing to pass through all the long apprenticeship which the craft demands, there may be things, requiring to be done at once, that are way in advance of the first year's work. These we will try to consider here.

Let us suppose that an old lilac bush is in the wrong place; what is to be done to get it into the right one, without killing it? If the time is summer there is just one thing to be done, above all others—that is, wait for the falling of the leaf and ripening of the wood. Never move any old and established *woody* plant while it is in leaf; move such things only during their dormant season.

Then first of all dig the hole to receive it—big and broad and deep. Be generous about it. After this is done, to the plant itself: in digging it up, work patiently. Here the pick will be most serviceable; loosen the soil thoroughly with it before taking any out with the shovel. Work always parallel with the outstanding roots of the plant—that is, parallel with a

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line coming from the plant, as a spoke comes from the center of a wheel. This insures striking down with both pick and shovel, *between* main roots instead of across them: thus it sacrifices less of them. Begin on the line of an imaginary circle drawn around the plant, as large as the spread of its branches. Commonly this will be the line of the spread of the roots as well. Take off the earth above the roots until they are loosened; then work them out gradually, taking off or picking loose as much more as necessary to release them without strain. Never pull or "yank" a shrub or anything else out of the ground; work things out, digging around and under the roots if need be. Tilt a plant back and forth and loosen the earth thoroughly away down, before attempting to lift it or drag it forth. There should be no violence done it, either in branch or root.

When it is finally released, take it at once to the place prepared for it and lay it down so that the roots may be examined and trimmed. No matter how carefully the work is done, there will be some broken and torn places—and these must be cut into smooth, even stumps, else they leave room for rot and disease to get a foothold. Trim off every broken or even badly bruised rootbranch: then go to the other end of the bush and trim off as much of its top, proportionately, as it has been necessary to remove of its roots.

Now fit it into its new quarters. Take great care that there are no roots turned underneath it, for these will hold it up and away from the earth on which it should

SOME GENERAL GARDEN TALK

rest, so that it will be in the state known to experts as "hung"—which is fatal to its ever being any sort of plant again, if it does not kill it altogether. Some things send out more roots laterally than they do straight down: these require a little mound of earth directly under their centers, over which they should be placed and over which all the roots and rootlets should be adjusted. Then the earth, broken until it is fine and smooth, must be sifted in and around and against every little root fiber, packed firmly, watered in—after enough of it is on so that water will not drive against the roots and cake mud around them—and so finally filled up to the top of the hole.

The operation is all perfectly simple, and just a matter of common sense and patience. Do not start such work when there is any chance of not being able to go right through with it to its completion: and never undertake it when the ground is wet enough to be soggy, for then it will not pack thoroughly up against the small rootlets, but will cake and make pockets around them—and will bruise and tear them too.

Herbaceous plants may usually be moved at any time during the summer, but it is better to wait until after they have finished blossoming, ordinarily. If the work is as well done as it perfectly well may be however, they need never know that they have been molested; in which case they will go right ahead and blossom as if nothing had happened. But with very large specimens this is hardly likely to be the case, even though as much earth as possible is taken up with

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them. The roots are bound to be more or less disturbed.

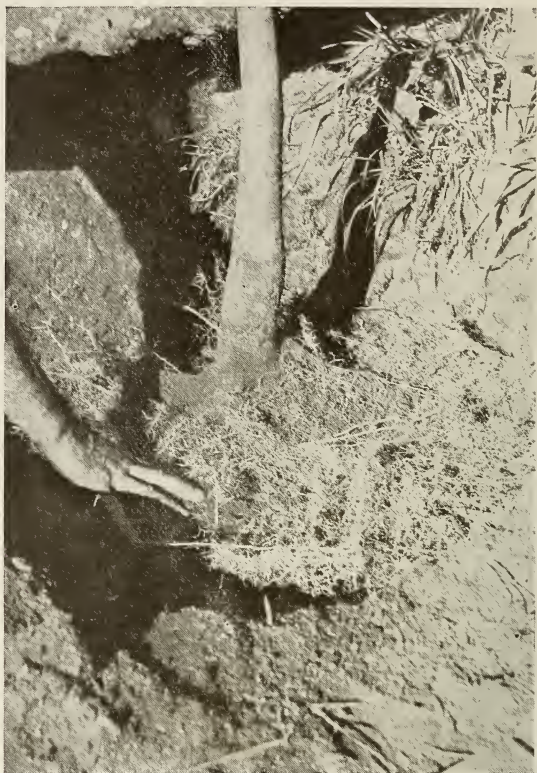
Holes for trees should be dug *as large as the full spread* of the roots, and if there are some roots running out beyond the line of all the others, dig a place for them especially. Put everything into the ground as nearly as possible *just* as it came out; face it the same way, with the north side to the north—this can be done by marking those things which are being transplanted within the garden—and set it at the same depth it was before—no more, no less.

Evergreens are in a class quite apart from everything else, when it comes to planting or transplanting, and the beginner will do better if he lets them alone. They must never have their roots exposed an instant to the air or the wind—hence they have to be handled always with a ball of earth as large as their roots—and this requires some skill and experience. The only time when it can be done at all by an inexperienced person with the slightest chance of success, is in the winter, when the ground is frozen so that it adheres to the roots. Then a specimen may be literally cut out of the ground, and moved into a hole cut to receive it; and it may live—but then again, it may not.

The chances are against it, for the ball of earth required to take in *all* the roots of even a small evergreen will weigh so much that the transplanter is likely to skimp it—and thus sacrifice more root growth than the plant can spare. For their roots are more necessary to an evergreen, in a way, than the roots of a deciduous



In moving any shrub or tree be sure to cut away with a sharp knife all broken or decaying roots before setting the plant into its new location



In transplanting a small tree or shrub, make the hole large enough to receive the full spread of the roots and see that these are gently and carefully arranged as nearly as possible in the way they were taken out

SOME GENERAL GARDEN TALK

tree are to it, inasmuch as an evergreen transpires from its leaves constantly, all the year around. Consequently it has no chance to catch up with a loss of roots. A deciduous tree will shed some of its leaves if it has to, to keep the balance—then proceed to grow new roots and then restore the leaves, and is quite as well off, both as to looks and health. An evergreen cannot do this.

Trees with thin, smooth, tender bark should have their trunks protected from the winter sun, after transplanting. A jacket of straw bound onto the south side of the tree with raffia is useful for this—or a coat of whitewash may be sufficient, the white resisting the heat rays sufficiently to afford all the protection needed. It is simply to keep the bark from drying and cracking until the sap returns and softens it in the spring.

In setting a hedge it is usually easier as well as better to dig a trench somewhat deeper than the roots of the plants would be expected to go. Put manure in the bottom of this, then sprinkle on an inch of loose earth; then stand the plants along, as near together as they should be—nine inches apart is the accepted distance for privet, more for evergreens, depending on the size of the plants when set—and fill in the earth all along the line, firming it down afterward by tramping.

Keep everything that is planted for ornament in masses; have a mass of lawn, masses of shrubs, clumps of trees, masses of flowers in borders or among shrubbery (never beds anywhere unless they are a part of the

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design of a formally laid out garden) and masses of one or two or three kinds of flowers to make up the larger border mass. Isolated planting will never produce anything more than interesting and perhaps beautiful flowers; beauty as a whole a place will lack unless the arrangement of the whole conforms to the laws of beauty which apply to all outdoors.

XXI

The Gardener's Calendar

JANUARY	
1	Inspect spraying apparatus and order whatever may be required. Make a plan, to scale, of house and grounds, indicating all planting already done.
to	Have all carting that must cross lawns done while ground is frozen.
15	Read up on insects and sprays; order whatever may be needed. Note spots requiring shrub, tree or group to improve winter effect.
15	Inspect tools, repair, note those needed and order them. Do the winter spraying as directed in chapter dealing with pests. Send to the best nurserymen and seedsmen for catalogues.
to	Make frames for hotbed and coldframe and get sash ready; make new flats.
31	Make a list of things to be done, check off as done—and finish each job!

FEBRUARY

SEEDS TO BE SOWN INDOORS

Flower	Vegetable	
Dianthus (clove pink)	Beans	Cabbage
Cosmos	Carrot	Celery
Any Perennials	Cucumber	Egg-plant
	Lettuce	Parsley
	Pepper	Radish
	Tomato	

1	Make detailed plan of vegetable garden, locating and giving planting date for each thing.
to	Show successive crops, with planting date, in different colored ink. Order garden seeds at once; prepare earth in flats; dress lawn with bone meal.
15	Order manure for hotbed, to be delivered on the fifteenth. Have all plans for improvements perfected and decided upon by now.
15	Pile manure where hotbed is to be; sprinkle if necessary; turn over on fourth day if steaming.

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February (continued)

to	Finish winter spraying; put sash on coldframe so it may thaw out. Read up on fertilizers and order what is required; tidy up labels and make new.
	Turn manure for hotbed again; spread manure on vegetable garden and borders.
28	Pack hotbed manure, put on frame, fix earth, cover with sash and let warm up.

MARCH

SEEDS TO BE SOWN IN HOTBED

Flower	Vegetable
Matthiola incana (stocks)	Beans
Ageratum (floss-flower)	Brussels Sprouts
Arctotis grandis (African daisy)	Carrot
Salpiglossis (painted tongue)	Celery
	Kohlrabi
	Parsley
	Radish
	Beets
	Cabbage
	Cauliflower
	Egg-plant
	Lettuce
	Pepper
	Tomato

1	Test temperature of hotbed often; sow seed as soon as it drops below 90° F.
	Transplant seedlings from flats as needed; watch and water and give air.
to	Put nitrate of soda and salt on asparagus beds and around rhubarb. Prune fruit trees; order nursery stock for April delivery; rake up litter.
15	Lime sour soils; uncover bulbs; prune hybrid perpetual roses.
15	Roll the lawn, dig out weeds, seed bare places; keep careful watch of the hotbed.
	Plant sweet peas; tie up vines anew; burn old branches; margin walks.
to	Grafting and sodding should be done now; sandy soil may be ready for plowing.
	Transplant indoor seedlings into thumb pots; attend to March spraying.
31	Make screen boxes for melons, get bean poles ready and finish inside work.

APRIL

SEEDS TO BE SOWN

HOTBED		OPEN GROUND	
Flowers	Vegetables	Flowers	Vegetables
Heliotropium (heliotrope)	Cucumber	Reseda (Mignonette)	English Beans
Aster	Egg-plant	Dianthus (pink)	Beets
Petunia	Melon	Cosmos	Brussels Sprouts
	Pepper	Gypsophila	Early Cabbage
	Tomato		Carrot
			Cauliflower
			Lettuce
			Onion
			Parsley
			Parsnip
			Peas
			Potatoes

THE GARDENER'S CALENDAR

April (continued)

		Eschscholtzia (poppy)	Celery Cress Kohlrabi	Radish Spinach Early Turnip
1	Transplant cabbage and cauliflower to garden if season is normal. Start seeds in frame left vacant by these; keep watch on all young plants.			
to	New shrubbery and trees may be planted now if ground is fairly dry. Prune grape vines and orchard fruits; dig around and fertilize everything.			
15	Set forced Easter plants and bulbs outdoors in the border.			
15	Rub sprouts from trees as soon as they appear; spray roses with Bordeaux.			
to	Divide and replant perennials that have been three years in one place.			
30	Spray everything as directed for late April. All planting of shrubs and trees should be completed by end of month.			
30	Set out pansies if they have wintered in the coldframe.			

MAY

SEEDS TO BE SOWN

Flowers	Vegetables
Matthiola bicornis (stock)	Artichoke Beans
Nicotiana (tobacco)	Beets Brussels Sprouts
Asperula (sweet woodruff)	Carrot Cauliflower
Antirrhinum (snapdragon)	Celery Corn
Ageratum (floss-flower)	Cress Cucumber
Arctotis (African daisy)	Kohlrabi Lettuce
Aster	Melon Onion
Calendula (pot Marigold)	Parsley Parsnip
Centaurea (bachelor's button)	Peas Potatoes
Delphinium (annual larkspur)	Radish Salsify
Gypsophila (baby's breath)	Spinach Early Turnip
Helichrysum (straw flower)	All Herbs
Lavatera (annual mallow)	
Matricaria (feverfew)	
Nasturtium	
Petunia	
Portulaca	
Salpiglossis (painted tongue)	
Scabiosa (mourning bride)	
Salvia	
Zinnia (youth-and-old-age)	

- | | |
|----|----------------------------------------------------------------------------------|
| 1 | Watch for late frost and keep mulch at hand to put on if it threatens. |
| to | Consult spraying table for dates of operations; several this month. |
| | Cabbage, cauliflower and sprouts need watching for insects; currant bushes also. |

THE GARDEN PRIMER

May (continued)

15	Keep weeds down right from the start; transplant seedlings as fast as they are ready for it. All spading and ploughing should be done by now.
15	Roses need whale-oil spray now; transplant everything from frames as soon as frost is surely gone. Do everything possible to encourage and entertain the birds; the garden needs them.
to	Thin out seedlings; indicate final distance apart of everything on its label.
31	Have labels ready before needed; this greatly facilitates the work. Spray and watch for insect depredations; prune the spring flowering shrubs that have finished blossoming.

JUNE

SEEDS TO BE SOWN

Vegetable

Beans	Beets	Broccoli	Brussels Sprouts
Late Cabbage	Carrot	Cauliflower	Corn
Cress	Cucumber	Endive	Kale
Kohlrabi	Lettuce	Melon	Okra
Early Peas	Potatoes	Pumpkin	Radish
Salsify	Spinach	Squash	Herbs

(also a third sowing of Gypsophila)

1	<p>Rub off all shoots on newly set trees and woody vines; trim ever-green hedges.</p> <p>Watch for currant worms, rose beetles, aphids, etc.</p>
to	<p>Spray as directed in spraying table, as often as necessary.</p> <p>Layer the joints of all squash and melon vines; tie up tall vegetables.</p>
15	<p><i>Thin out and keep thinning out!</i> Rake the ground twice a week at least.</p>
15	<p>Watch for the castings of borers at base of trees and everywhere; dig them out with a wire or jack-knife.</p>
to	<p>Pick off all seed pods from perennials and annuals to keep up their bloom.</p>
30	<p>Spraying, weeding, thinning, are the three June "perpetuals."</p>

JULY

SEEDS TO BE SOWN

Vegetable

Beans	Beets	Carrot	Corn
Corn Salad	Cress	Cucumber	Endive
Gherkin	Kale	Kohlrabi	Lettuce
Nasturtium	Okra	Early Peas	Pumpkin
Radish	Spinach	Squash	White Turnip

(also second sowing of Reseda)

THE GARDENER'S CALENDAR

July (*continues*.)

1	Pinch back rank growing things, thus keeping them to a good bushy form.
to	Re-work the garden after harvesting early vegetables and sow new crops.
15	Vegetables sown now supply the table in October; do not neglect this.
15	Start perennials outdoors as directed in Chapter XVII, for next year's flowering.
15	Keep up the tillage of everything; tie things up as fast as they grow.
to	Spraying operations go on still; keep track of them by the table.
31	Remove suckers from all trees; they are devitalizing. Use fertilizers as you see the need for them. Destroy, by burning, anything that seems hopelessly sick or infested with scale or borers.

AUGUST

SEEDS TO BE SOWN

Bush Beans	Tuberous Chervil	Corn Salad	Cucumber
Endive	Lettuce	Welsh Onion	Early Peas
Radish (winter)	Spinach	Turnip	

1	Order evergreens for delivery the middle of the month.
to	Sow perennials if this was not done in July; the coldframe is a good place for them.
15	Keep everything mulched with lawn clippings around its roots to conserve moisture.
15	There is still spraying to be done for the codling moth; watch out.
to	Roses need care every week of every month.
31	Mow the lawn regularly even if it is dry; do not let it get weedy.

SEPTEMBER

SEEDS TO BE SOWN

Cabbage for coldframe	Cauliflower for coldframe
Tuberous Chervil	Corn Salad
Cress	Siberian Kale
Lettuce	Mustard
Winter Radish	Spinach
Turnip	
(also Sweet Peas for next summer)	

1	Order bulbs at once, for indoor and outdoor use.
to	This is the time above all others to plant peonies.
31	Set about making the corrections in flower borders that the summer has shown were needed.

THE GARDEN PRIMER

September (*continued*)

15	Perennials that have finished flowering can be moved now and be ready for next year.
15 to 30	Save all leaves, dead branches (of healthy plants) and everything that can go to make compost. Cut out old canes of berries. Keep weeds out; cut off seed pods, but let the tilling go from now on. Save seeds from any favorite that you may wish to propagate.

OCTOBER

1 to 15	Rake up bare spots in lawn; dress with sheep manure and seed liberally. Keep the grass cut as regularly as in midsummer, up to the last minute. Fall planting should be done this month; order shrubs and trees now. Cut down the tops of perennials that have died, except where this is advised against.
15 to 31	Get the winter dressings ready or arranged for, in good season. Set out bulbs as directed in the chapter dealing with them. Clean up everywhere, spread manure over the vegetable garden, plough or spade it and leave it for the winter. Transplant the plants to the coldframe that are to be wintered there.

NOVEMBER

1 to 15	Pile everything in the shape of rakings into a heap, mix a little lime through it or not, and thus prepare compost for spring. Root vegetables are now to be stored for the winter. Seed of corn salad, kale and spinach may be broadcasted over patches of the garden for early spring use. Give rhubarb and peonies a heavy dressing of manure.
15 to 30	Take up tender bulbs and tubers, shake the earth from them and handle as directed in the bulb chapter.

DECEMBER

1 to 31	As soon as the ground freezes, mulch everything with leaves or straw. Salt grass is often used and has the advantage of not being full of weeds. Hold mulch in place by some shovelfuls of earth thrown over it. Cover coldframes at night with straw mats and wooden shutters. Gather all cocoons and everything that looks suspicious, from every tree and shrub, and burn them. Trim out dead branches and prune generally, except spring-flowering shrubs.
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