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V. PLANTING AND MAINTENANCE

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Fig. 1—No matter how well planned and executed, the garden of our dreams will never be realized unless scrupulously maintained



Root, Ralph Rodney

LANDSCAPE GARDEN SERIES

# PLANTING AND MAINTENANCE

BY  
CHARLES H. LAWRENCE, B. S.



THE GARDEN PRESS  
DAVENPORT, IOWA

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## CHAPTER I

### LISTING, SELECTING AND ORDERING PLANTS

**A**LTHOUGH it is necessary to give numerous hints on good maintenance, the work, or, I might more truthfully say, pleasure of providing it is really not such a comprehensive task as it might seem. An old gardener once expressed his idea of success, in a few words, "Look to your garden a while each day and get the weeds while they are young." Thus, if one knows just what to do and when to do it, and does not put it off, the task, which at first might seem huge, becomes a minor one.

The importance of providing careful direction and guidance in growth cannot be overestimated. All planning is done with an idea in mind. When the idea is carried out in the actual arrangement of land and landscape, the forces of man and nature must combine if the idea and purpose of the design is to be realized. A place carefully planned and laid out never offers the best appearance if it is not properly maintained throughout the year.

Proper care includes more than keeping things clean and neat, although that is a large part of the work. Proper care includes, also, attention to the things which have to do with the health, growth, and appearance of the plants that they may have the best chance to do the work prescribed for them.

It is not the purpose here to provide a manual of gardening, but to give those points concerning planting and maintenance which have been found to be most needed or desired by the home owner, and attention to which will insure more than the average success in planting and caring for ornamentals.

#### LISTING NEW PURCHASES

After the plans have been made and the plants specified, the lists for ordering must be prepared. Listing the chosen varieties offers an excuse to ramble through the catalogues to find new friends or old favorites.

A list for ordering, properly made out, includes:

1. The number of plants desired.
2. The complete Latin or trade name.
3. The size, grade or age.

4. Individual specification where desired, such as bushy, specimen, hedge, etc.
5. Shipping instructions and date receipt of goods is desired.
6. Any information which will enable the nurseryman more easily to understand what is desired.

It is wise for the home owner to request the nurseryman, if the order contains materials not hardy in the locality in which the purchaser resides, either to advise the purchaser that another choice can be made or else to make suitable substitution. The order, where possible, should be made out on the blanks furnished by the nurseries.

In handling planting on a large scale, less consideration is given to catalogues as a rule, and a complete list in duplicate is sent to various growers to secure quotations on sizes and prices. For the average small order it is best to consult the catalogue of the dealer with whom the order is to be placed. In many of the named varieties of such things as peonies, irises, and roses, various growers have their own special creations and varieties which other dealers cannot supply, or which, sad to say, they may offer under different names.

#### SIZES TO SELECT IN ORDERING SHRUBS

All shrubs may be classified as low, medium, or tall growers. Nurseries list them this way or with the abbreviations, "L" (No. 1), "M" (No. 2), and "T" (No. 3), or give the ultimate height in growth. Some plants are listed according to age because often it is the age and not the height that counts. The larger the shrubs grow the more sizes are available for purchase, as a rule. These sizes may be quoted as 1-2', 18-24", 2-3', etc., meaning that the height of the plant furnished comes within the specified range. Some firms simply say that their plants are of a good size suitable for transplanting. In case of a reliable grower this may be satisfactory, but the safest way is to specify the size and see that it is received.

The larger, or older, shrubs are usually the highest priced; consequently choosing the size involves consideration of not only which is the best size for the purpose, but which is the best size considering the amount of money to be expended. If expense is immaterial, the largest and best developed plants, up to a reasonable size capable of being easily handled, would in most cases be best. Where some shrubs are of more importance than others in that they may be desired for accent purposes, choice specimens, or to be used in a very prominent place where an immediate effect is desired, they should be given preference in choice of size to those used in less prominent places where an extra year or two necessary for growth would not make any particular difference.

The cheapest way, though not considered best, is to use small sized plants, planting them at the proper distance even though there is no immediate good effect. However, most people want a fairly good effect at once. This can be secured by using well-developed plants placed fairly close together or by crowding together smaller plants. There is little difference in the cost of either of these methods. The cost of large plants placed far apart slightly exceeds the cost of the increased number of smaller plants that it takes to fill the same space when placed close together. This is especially true in hedges. A good way, not the most or not the least expensive, is to choose medium-sized plants where that choice can be made giving to each plant as much as possible of the room it will need for development, yet placing the shrubs close enough to secure a fairly good immediate effect.

#### SIZES TO SELECT IN ORDERING TREES

The best rule to follow in most cases is to secure a medium-sized tree that can be easily handled. Where the expense is not too great and where it is possible to secure experienced help, who have the proper equipment to handle the larger sized trees, a great many years of patient waiting will be avoided in their selection.

#### SIZES TO SELECT IN ORDERING PERENNIALS

Herbaceous perennials are offered by commercial growers as clumps, pot grown plants, or two-year-field-grown plants. Clumps are old plants with a crown and mass of roots. They are used to obtain the quickest effects. Unless divided, clumps are apt to die back from the center. Due to this and to the short season in which they must be handled they have become less popular than the other forms. The pot-grown plants have the advantage of having a longer period in which they can be handled. The plants are grown in pots and are easily set out. Pot grown material has good resistance and is a staple form. Two-year-field-grown plants are similar in size and age, to the pot-grown class, but they have been grown in the field and are not handled with dirt about the roots. Very satisfactory results can be obtained with their use and many growers offer them entirely.

#### SIZES TO SELECT IN ORDERING EVERGREENS

Evergreens for mass planting should be of the heights called for according to their position as studied out and specified on the plan. Quotations are often given at a specified rate per foot; thus it is easy for one to figure out the size that can be afforded and ordered. For safety in handling evergreens it is necessary in most cases that they be balled and burlaped, and crated or boxed for shipment. This should be specified in the order.

## WHERE AND WHEN TO PURCHASE PLANT MATERIALS

To get particular varieties or specialties one naturally has to secure them where available. If shipping problems were never encountered, one could order where the best goods and best prices were offered. Distance means increased cost in transportation and liability of delay in shipment. Large orders in car load lots are much more satisfactory for long shipments than small orders. Material is less apt to dry out on the road if received from a nearby point. Stock grown in nurseries in the same latitude or north of where it will be planted is claimed by some to be hardier. Local nurserymen may in some cases charge more for material but in return give special service in handling, protecting, and delivering the plants. Determining the place to order seems thus to be largely a matter of judgment based on individual needs.

As to the time to order there is always one good rule to follow. Order early and in advance to the planting season. Ofttimes orders are filled in the order they are received. Early ordering means better service and better plants. Although many reliable nursery firms have men on the road selling goods, there are occasional instances of misrepresentation; the home owner should be quite sure that the salesman has good credentials and represents a reputable firm if payments are made in advance. The writer knows of actual cases where people have purchased and paid for goods in advance and never received them. Agents of this type are generally offering special inducements and questionable creations and although an "Independence Plant" having red, white and blue blossoms on the Fourth of July might appeal in a picture, yet it is certain that such a novelty will be a disappointment.

## CHAPTER II

### SOIL PREPARATION

**T**O get the best results in any planting, the soil requirements must be considered. Even before the plans are made, the nature of the soil should be determined, for certain groups of plants like certain soils. It is easier and better to use those plants which are adaptable to the kind of soil available, but when one wishes to grow some particular variety of plants that requires soil of a definite nature, certain prescribed methods of soil treatment and preparation have to be used.

By digging a small hole about two feet deep, something of the character of the soil will be revealed. When the hole is dug the different layers encountered should be piled separately for later examination. The sides of the hole will reveal the thickness and character of the different layers when they are present. Even when there is no visible division of layers in the soil there are two distinct divisions commonly present, first, the upper layer of surface, or top soil; second, that which lies beneath the surface layer, or subsoil. Both topsoil and subsoil have to be considered in soil preparation.

#### SOIL TEXTURE

Soil texture is determined by the size and shape of the particles of which it is composed. The structure of the soil is determined by the arrangement of its particles, and according to structure a soil is loose, open, hard, porous, compact, etc.

Part of the soil preparation consists of taking whatever measures are necessary to give the soil the proper texture for the growth of plants.

When the examination shows that the soils are too heavy or too light, special material changes have to be made. A heavy soil is spoken of as meaning one whose particles are so fine that the soil has a tendency to compact very easily. The clays often fall into this class. Light soils are those which are loose, open and porous. Sandy soils are light soils, which, as a rule, require special treatment.

The stiffness of clay soils can be lessened by applying and mixing ashes or sand. To offset the impoverishing effects of ashes or sand, an equal amount of well rotted manure should be used. Often times a heavy application of the manure will do the work by adding humus to

the soil. Humus is decayed vegetable matter. The application of lime, which aids in breaking up the soil, is particularly desirable in improving clays. Clay soil should never be worked when it is wet enough to form a sticky ball when crushed in the hand.

With light soils the main trouble is that they are apt to be devoid of humus, and to heat and dry out too quickly. Any material such as well rotted manure, which will add humus to the soil, will work the necessary improvement. Sandy soils are not necessarily undesirable if the moisture content is correct.

### DRAINAGE

Good drainage is absolutely necessary to keep the soil in the best condition for growing purposes. Certain plants, such as bog or marsh plants and water plants, of course, are exceptions. When the soil has a tendency to remain overly moist, or to become soggy, it needs to be drained. Water gathering in depressions must have an outlet. Good drainage is naturally provided in soils which offer an escape for excess water. In many soils the subsoil is impervious to water or hard enough greatly to retard the passage of water through it. Drainage for planting areas is absolutely necessary when the beds are prepared by excavating hard subsoil and refilling with loose soil.

Drainage through hard and impervious subsoil is oftentimes accomplished by opening it up by means of the shattering and loosening effects resulting from dynamite exploded in the soil. Planting areas, when underlaid with a hard subsoil, can be drained in that way or by placing a layer of stones in the bottom of the bed. When stones are used to a considerable depth there is less need of an outlet. Otherwise an outlet will have to be provided. A method commonly used that is some-

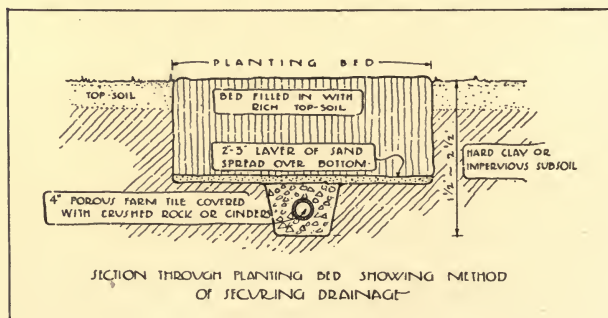


Fig. 2



times considered better, is to drain the planting bed by laying a line of porous farm tile along the bottom in a manner shown in the drawing. (Fig. 2). Suitable outlets for drains must be provided. A line of porous tile will drain the soil on each side of it to a considerable distance. Tile lines laid at intervals and piped to suitable outlets will effect drainage for areas of any size.

### SOIL FERTILITY

Soils are made fertile by using proper methods of tillage, by introducing into the soil at frequent intervals the amount of organic matter necessary to give the soil the proper texture and water holding power, by maintaining the proper conditions of drainage, and by adding to the soil, when necessary, such organisms as are essential to the growth of particular plants.

The preparation of planting areas offers the one best opportunity for incorporating with the soil those elements which, acting as the main food of plants, are necessary for their growth. Rather than take time to experiment with the soil to determine what scientific methods would have to be followed to make it most suitable, it is safe to assume that the main kind of food needed by the plants can be safely applied in reasonable quantities.

Fertilizers are materials added to the soil for the purpose of supplying food for plants. A soil amendment is a substance of material that modifies the physical, chemical and mechanical nature of the soil. Manure is both fertilizer and amendment. Lime is used mostly as an amendment being applied to correct acidity in soils or to help break up the particles.

The intensity of the use to which soil is to be put coupled with the permanency of the preparation or the inability to add fertilizer at a later period should determine the extent to which fertilizing should be done when the planting beds are prepared.

### FOODS NEEDED BY PLANTS

All growing plants take from the soil nitrates, potash, and phosphates, and these are the main elements which should be supplied as plant food. The work of these three elements varies of course; but, speaking in a general way, nitrogen promotes luxuriant growth in leaf and branch, potash builds up and adds strength to wood and fruit, while phosphate seems to contribute to the growth in general.

For ordinary purposes the amount of food that should be supplied to the average soil may be supplied in a compound fertilizer where these three elements are proportioned as follow: 4 per cent nitrogen, 8 per cent phosphoric acid, and 10 per cent potassium.

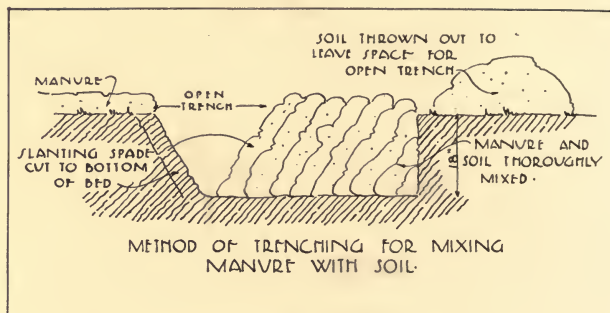


Fig 3

Fertilizers supplying these elements are of two kinds, "organic" and "inorganic." Organic fertilizers are derived from animal and vegetable sources and include such substances as ordinary stable manure, dried blood, guano, and wood ashes. Chemical fertilizers, such as phosphate and nitrate of soda, are those which have chemical origin and are derived from a source not connected with animal or organic life. Artificial fertilizers or commercial fertilizers may be organic or inorganic. They are fertilizers made available in concentrated form, and put up in such shape that they can be conveniently used and handled commercially.

#### WHAT FERTILIZERS TO USE

Intelligence in the choice and use of fertilizers to avoid waste and duplication is paramount. Only that fertilizer should be used which will satisfy the purpose. Fertilizers whose substances become quickly soluble, and, hence, whose strength will quickly wash away, are valuable for use only at times when their substance can be immediately taken up and for forcing purposes in growing flowers and vegetables. The best all-around fertilizer is well rotted manure. Fresh manure can be used when it will have a chance to rot in the soil or where its application will not cause it to come in contact with the roots or tops of plants. Fresh manure is apt to contain an endless number of weed seeds.

Compounded fertilizers of various formulas can be secured from stores making a business of handling them. It is usually more convenient to purchase prepared or mixed fertilizers when a small amount is needed than to resort to home mixing.

When the desire is to supply the different elements separately one can use separate materials which are a source of that particular ele-

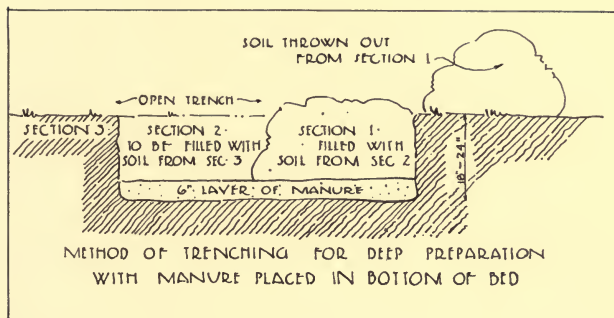


Fig. 4

ment. Nitrogen is available in nitrate of soda, stable manure, sulphate of ammonia, and dried blood. Phosphorous can be added in the soil in the form of acid phosphate or bone meal. A layer of raw bone left to rot in the bottom of the planting bed will answer the same purpose. Potassium can be supplied in the form of potassium, sulphate, kainit, or unleached wood ashes.

#### APPLYING FERTILIZERS

Manure is generally applied at the rate of 16 tons to the acre, which means about a two-horse load to a space 50 by 50 feet or a 2-bushel wheelbarrow load every 4 square yards (6 by 6 feet). This is a good standard for most borders. The manure can be spaded in and mixed with the soil or left in a layer in the bottom of the planting bed, or used purely as a top dressing.

Fertilizers whose substance disintegrates slowly should be applied at a time when they can be thoroughly worked into the soil. Lime and fertilizers that become quickly soluble are generally applied as top dressings.

When the fertilizers have such strength that a little goes a long ways, as is usually the case with commercial fertilizers, an even distribution can be obtained by mixing the fertilizer with sand or fine earth before applying. Care should be taken not to mix certain materials for application. Lime should not be mixed with manure, bone meal or acid phosphate, but should be applied separately as a top dressing. Barnyard manure should not be mixed with lime in any form, nitrates or Thomas Slag. Acid phosphate should not be mixed with forms of lime, Norwegian nitrate or Thomas Slag.

## PREPARATION OF PLANTING AREAS

Proper preparation of the soil is one of the biggest factors in getting success in planting. The least that can be done is to provide one good and thorough spading to a depth of the average spade (9 inches). The best way is to go two spades deep, loosening up the soil to a depth of 18 to 24 inches. To do this a process called trenching is followed (Figs. 3 and 4). Trenching is done in one of two ways. One method which brings about a thorough mixture of soil and manure is particularly desirable for shrub beds. The other method also accomplishes deep preparation of the soil, but differs in that the manure or fertilizer is placed in a layer at the bottom of the bed. This method is desirable for perennial plantings.

Where the subsoil is too poor to be used, it can be removed from the bed during trenching operations. In trenching planting beds, enough soil is dug out at one end of the bed to make a trench, which is carried along the entire length of the bed as the soil is worked. The soil thrown out at the beginning is used to fill the trench at the opposite end of the bed. It is well, where possible, to prepare the beds in advance of the time the plants will be received. Preparation of beds in the fall for the spring shipment is a good idea.

## CHAPTER III

### PLANTING

#### CARE OF PLANTS BEFORE PLANTING

**A**FTER the shipment arrives an examination of the stock should be made. Evergreens, if at all dry, should be placed in the shade, away from drying winds, and sprayed. Trees and shrubs need not be removed from the packing at once if they are in a moist condition and will be used in a day or two. If several days will intervene between receipt of the plants and planting time, the bundles or boxes should be unpacked and the plant material stored. The air should be allowed to reach the tops only; the roots being kept moist by suitable protection. Although most any covering of some fine material that can be kept moist will serve to keep roots from drying out, the best and most general practice is to heel the plants in the ground. "Heeling in" consists in placing the plants in a trench and covering the roots with soil. The plants are generally sloped at an angle of 45 degrees when laid in the trench, as they are then easier to handle. For temporary heeling in, the bundles of the different kinds need not be broken, but if the shrubs are to remain in the trench any length of time, each bundle should be opened that every plant will be protected and receive moisture.

Certain emergency measures are sometimes necessary when stock is received out of condition. Material that has become very dry should be thoroughly soaked as it is heeled in, or better, the whole plant completely submerged in water for a couple days. When the roots of trees and shrubs are frozen they must be thawed out gradually. A gradual thawing by soaking the roots in water of freezing temperature, with ice and snow mixed in, and then heeling in the plants in unfrozen ground will sometimes save them. Soaking the roots of evergreens that have thoroughly dried out is of little or no avail. Their roots are resinous and water will not soften and freshen them.

#### PLANTING SEASONS

In climates where the summer comes on hot and dry early in the year, plants which will stand fall planting will do best if planted in that season. The seasons are short enough as it is, and when fall planting can be done, the opportunity should not be neglected. The period during which all plants can be moved with the greatest degree of success is during their dormant period. Most any woody plant, not too

large, could be moved out of season, however, if the proper precautions were taken not to disturb the roots. Deciduous trees over four inches in diameter can be moved in mid-winter with the earth maintained about their roots in a frozen ball. In fact, if trees of this size or larger are not specially dug so as to get most of their roots, the frozen-ball method of moving them is about the only sure way. Evergreen trees can also be moved in mid-winter in the same manner and most evergreens over 15 feet in height must necessarily be moved with a frozen ball of earth.

Trees and shrubs become dormant after the buds have ripened and the leaves withered or dropped. They remain inactive from then on, until warmth and moisture again starts their growth. With the exception of thin-barked trees, such as beech and birch, and fleshy rooted trees such as the tulip tree and magnolia, fall planting is usually possible. By keeping roots cool and moist, trees and shrubs may be handled and planted any time while the ground is open during the dormant period.

#### HOW TO PLANT SHRUBS

A great deal of care should be given to the important operation of planting. First, go over the plant and carefully cut away all broken or diseased portion of the roots. It is always well to cut the tops back one-third or one-half, but if the pruning is done before the plants are put in the soil, as it should be, then the condition of the roots will give some idea as to the extent the top should be pruned. If there is a great deal of top and few roots, then the cutting back should be more severe than if there are plenty of roots. Pruning also helps prevent drying back from the tips and encourages the plant in making its new growth to send out a bushy growth from the bottom.

After the shrub has been prepared for planting, a hole should be dug large enough to allow the roots to spread out naturally and deep enough to allow planting at the proper depth. It is better to have the hole too deep than too shallow as the plant can be raised up a trifle as the dirt is placed in around it. The shrub should be planted as deeply or a trifle deeper than it was in the nursery. When the planting is done on slopes where previous preparation of the soil is impossible, the hole should be dug quite large to provide sufficient loose soil to give the roots a chance. The sod should be laid to one side and if a forkful of well rotted manure, some bone meal and a handful of potash are thoroughly mixed with the soil in the hole dug for each plant, the plant food requirements, not otherwise satisfied, will be amply taken care of for several years.

In planting the shrub, the important thing is to get the soil worked in among the roots. This is done by using loose soil, by shaking the plant gently up and down as the soil is thrown in, and by working the

soil down among the roots with a stick about the size of a broom handle. Before the hole is completely filled the soil should be packed firmly by pressing it with the feet. If the shrubs are to be watered, the hole should be left before all the soil is thrown in, so a good portion of water can collect there and soak in. Watering is done in case of late spring planting when there is apt not to be much rain and the weather has started to become quite warm. After the water has soaked in, the soil should again be made firm, the plant straightened, and the hole filled up with loose soil, left loose, to act as a mulch.

It must not be forgotten that during this process the roots are exposed to the atmosphere for a time. Precaution should always be taken to prevent their drying out. The plant should not be dug from the heeling-in trench until necessary and then should be kept covered with canvas or wet gunny sacking. Sometimes, as the hole is dug, the loose soil is thrown over the roots for their protection. Another method, and a very good one, indeed, is to dip the roots of the shrub in a puddle of mud especially made for the purpose. This not only provides protection for the short time they are exposed, but performs about the same service for the plant that watering after planting would and in many cases where the soil is apt to become hard it is better than watering. The mud on the roots should not be allowed to become dry before planting.

#### HOW TO PLANT TREES

The same principles that apply in planting shrubs apply in planting trees. There must be the same care taken in pruning, in protecting the plant against drying out, and in the actual process of planting. Other than these points of similarity in trees and shrubs there are a few special considerations that apply to trees.

The hole should be dug considerably larger than the spread of the roots and deep enough to allow a goodly amount of loose soil to be left in the bottom before the tree is planted. As the soil is removed, the topsoil should be placed in a pile separate from the subsoil. Any fertilizer that is to be used can be mixed thoroughly with the soil or covered in the hole in such a way that it will not come in direct contact with the roots of the plants.

If the subsoil is very hard and heavy it should be broken up with dynamite. Frequently it is thought that if the hard soil taken out is not used and good soil substituted the tree will have a better chance, but this is not usually the case. Water will easily penetrate all loose soil and failing to escape will settle around the tree often causing it to die. Thus it is best to provide drainage by breaking up the subsoil and if drainage is provided any amount of good soil can be used to fill the hole if it seems desirable.

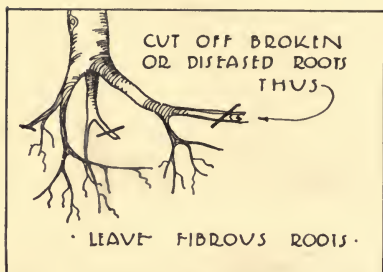


Fig. 5

The tree should be pruned as shown in the drawings. (Figs. 5 and 6). In removing broken or diseased parts of roots the cut should be clean and sharp and so slanted that the exposed surface will be toward the bottom of the hole. This insures a more ready contact between the root end and the soil thus providing a better water supply and better chances for an early and quick growth of new roots.

In planting the tree, cover the bottom of the hole with a layer of loose subsoil in which manure or fertilizer has been thoroughly mixed. Place the tree in the hole, spreading the roots out naturally, and cover well with topsoil. The soil can be worked in about the roots by shaking the tree up and down and by working a stick the size of a broom handle in among the roots as the soil is thrown in. After the roots are covered with soil the ground should be firmed about them by packing the ground with the feet.

When the soil thrown in about the roots is not fine enough to prevent the formation of little air pockets, a good soaking will be of great help. The water will wash loose soil particles into these voids and around the roots. Soaking or puddling the ground about trees is also beneficial when the tree is planted late in the season after the buds have started to swell. The puddling will do the same work that the rains would have done had the tree been planted earlier in the season.

In filling the hole, the dirt should not be left heaped about the tree in a mound that will shed the water. If there is sod about the tree the top of the hole should be left at a level below the sod. Where the sod does not form a barrier to keep the water from running off, the dirt can be brought to its highest level at a point away from the tree thus forming a depression which will catch the water.

Experience has shown that newly planted trees require a support if it is important that they grow and remain straight. A common



method is to anchor the tree to a stake in the manner shown in the drawing. (Fig. 6). Although one stake, if properly set, will do the work, two or three are often used. Another method is to use two or three wires, each having one end fastened to the tree at about breast high and the other end attached to a stake four or five feet away. Care must be taken to protect the tree from the wire by using rubber hose and a few board splints as an insulator. The wire should be left loose enough to allow for the growth of the tree or the tree will become choked from binding.

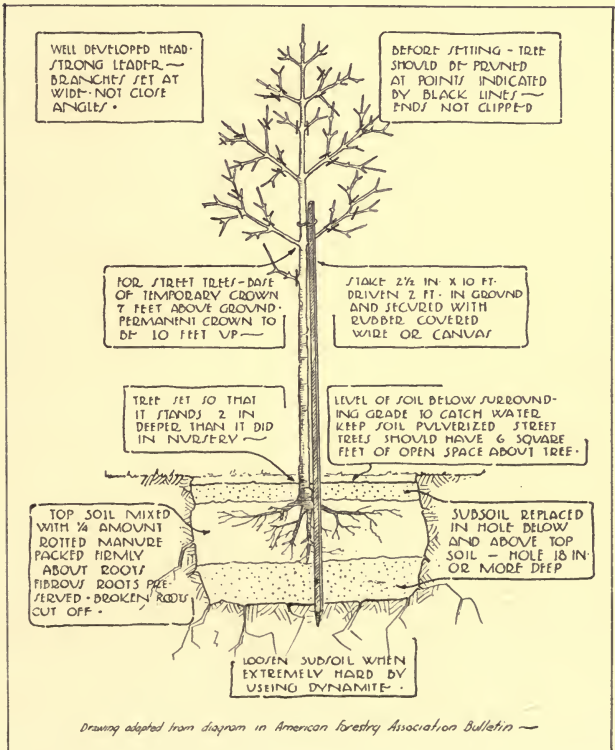


Fig. 6

### WHEN TO PLANT EVERGREENS

Spring is the best time to plant evergreens, although in parts of the country fall planting has been found to be successful and desirable. Spring planting can be done in late March, if the ground is open, or in April or May. The best time to plant is just as the buds are beginning to swell and before active growth has started. Late May or early June is the time when most evergreens begin their new growth and if this has started, the planting should be postponed until August or September, when the new growth will have become sufficiently hardened. Stock planted after the growth has started requires shading and frequent spraying or failure will result.

Fall planting is most successful where there is not apt to be droughts in October and November. Fall planting should be done early in the autumn, generally in August and September, when the ground is still warm, so that the plants can become well established before freezing weather begins.

### HOW TO PLANT EVERGREENS

Evergreens like a good loamy soil in most cases. Heavy binding clays and light sandy soils should be removed from the planting bed if a good loam is available to use instead. Poor soil can be improved with a liberal mixture of well rotted cow manure. When the soil is good, it is better not to mix manure with it.

The excavation for planting should be a foot deeper than the root ball and at least three or four times as large. The soil thrown back into the planting bed to bring it up to a level for planting should be well firmed. Water poured in at this time will help settle the soil and provide moisture that will last some little time. Planting depth is determined by the soil mark on the tree, which shows how deep the tree was planted in the nursery. Enough soil should be placed under the earth ball to allow the top of it to be slightly below the ground level. After this is done the soil can be filled in around the ball and be well packed or firmed. Shaping of the soil into a shallow basin around the tree will enable rain to accumulate there and soak into the ground. Spraying the tops every evening after planting until the new growth appears will be of benefit to the plant when the weather is hot and dry. A mulch of well rotted manure will conserve the moisture in the soil and help to keep it from becoming hard.

### HOW TO PLANT HERBACEOUS PERENNIALS

Where the roots are loose and fibrous, the hole to receive the plant should be dug wide enough and flat enough at the bottom to allow the roots to spread out naturally. A pointed narrow hole is

good only for plants having roots like carrots. If large clumps are broken apart, or if roots are broken or diseased, the affected parts should be severed with a clean, sharp cut. Broken roots that are not cut are apt to become diseased. The depth of planting is determined by the nature and habit of the plant.

When the stock can be secured early, spring is usually the best time for planting perennials, for the danger of winter killing can be avoided. Spring planting should be done as early as possible after the ground has become mellow enough to be worked.

Fall planting is also desirable especially when the planting can be done early enough to enable the plants to get established. Peonies and Iris do better if planted in the fall. Fall-planted perennials are more apt to flower the first season. Fall planting should be done as early as possible to allow the plants to become established in their new locations. It is safe to start fall planting after the hot dry period of summer has passed and the early fall rains have started. When planted in the fall, all perennials should be covered to prevent their being winter-killed or heaved out by the frost. (See Page 26 for coverings).

#### PLANTING ROSES

Both fall and spring planting of roses is desirable. Rugosas, hybrid perpetuals, and hardy climbers may be set out in the fall as a rule. In most localities, early spring planting is best for the more tender sorts. In the extreme north where there are strong drying winds in winter, early spring planting is best for all varieties. Fall planting should start as soon as the leaves have fallen. Spring planting should be done as early as possible after the soil has become mellow.

Roses require a plentiful supply of organic matter in the soil, thorough drainage, and a water supply which is reasonably constant throughout the growing season. With these requirements satisfied, roses are adaptable to a wide range of soils, but as a rule they prefer soils of the heavier type.

Roses should be planted in the same manner as shrubs (see Page 18) using the same care in every detail. All grafted roses should be planted deep enough to bring the joint between the root stock and top at least two inches below the surface of the ground. Unless this is done the strong sturdy root is liable to send up a shoot which, if not cut off, will flourish in growth, causing the grafted top to die. In place of a fine attractive rose there will appear a straggly wild sort.

The pruning of roses for planting differs according to the type of rose being planted and the purpose for which it is to be used. Newly planted roses need more severe pruning than those already established. Weak growth always requires more cutting back than stronger growth

If planted in the fall the dormant rose should be cut back to about half its length. In the spring these roses should be pruned again, leaving but two or three stems with four or five eyes on each. Spring-planted roses should be cut back to the same extent described for fall-planted roses and in the same manner except that the pruning is to be done in one complete operation instead of two. In the milder regions where there is no danger of harm from the frost, fall planted roses can be cut back far enough to make additional spring pruning unnecessary.

#### SPACING ROSES

Hybrid perpetual roses should be planted from 2 to 3 feet apart. Tea roses can be set from 18 to 30 inches apart. Hybrid tea roses, having considerable range in character of growth, require from 20 inches to 3 feet between specimens. In each case the distance apart depends upon the vigor of growth, the proposed treatment and the locality. The Bourbon and China roses should be planted about the same as the hybrid perpetuals.

#### PLANTING BULBS

Most hardy bulbs should be planted in October or early November depending upon the locality. Early planting of spring flowering bulbs enables them to form roots before the winter sets in that they may throw up their leaves and flowers as soon as the frost is out of the ground.

Any medium soil having a fair degree of richness is good for bulbs. If manure is used in the preparation of the soil it should be well rotted, for fresh manure will rot any bulbs that come in contact with it.

Where different varieties are to be planted they should all be laid out on the ground at one time to get the proper spacing. Bulbs are spaced according to their kind and use. In naturalizing, the bulbs should be scattered in handfuls, planting them where they fall. In no case should they be planted too thickly or sparsely. For formal bedding the following table can be used for depths and distances:

Name	Depth Inches	Distance Inches
Tulips.....	4 (over tip)	5- 7
Lilies.....	5	12
Hyacinths.....	4	6- 7
Narcissus.....	4	6-10
Scillas.....	3	3- 4
Jonquils.....	3	5- 6
Colchium.....	3	3
Snowdrops.....	2	3
Anenomes.....	1-2	6

The planting depth for bulbs is determined in a general way by the size of the bulb. The distance from the top of the bulb to the surface of the ground should be at least one and one-half times the thickness of the bulb. All bulbs of the same variety which are to blossom at the same time must be planted at equal depths. To insure the best results with bulbs, and with lilies especially, place a bit of sand in the hole that is to receive the bulb and then use enough sand to completely cover the tip. The sand protects the bulb and helps to keep it from rotting.

## CHAPTER IV

### GENERAL MAINTENANCE

**T**HE period of greatest trial to all new plantations is during the first winter and summer. Consequently, all the care and attention that can be given should be involved to see the plants safely through this period. The same precautions that are taken the first seasons should be repeated yearly in a moderate way at least, if the best results are desired.

Where the climate is at all severe, some protection is usually necessary to prevent winter-killing of the plants. Winter-killing can take place in any winter and results from cold open seasons where there is much alternate freezing and thawing; from the formation of ice sheets; and from sudden changes in temperature and other climatic extremes. Old and well established plants often kill out or kill back to the roots from these causes.

Winter protection is given to plants in various ways. There may be wind-breaks to ward off the strong drying winds, coverings over each individual plant, a protective coat over the ground, or all three combined, when necessary. In every case the principle is not to keep the plant from getting cold or frozen, but to prevent alternate freezing and thawing, and to provide protection from other adverse conditions. A striking example showing an application of this principle in a winter covering is offered in nature herself. In the northern part of the country where snows come early and stay late and form a light, snug blanket over the earth, many plants, which cannot stand winters in a milder climate, are hardy.

#### COVERING BORDERS FOR WINTER

A mulch to perform the work of preventing alternate freezing and thawing is necessary in localities where the snowfall is absent or uncertain. A good mulch for all general purposes may consist of well rotted manure, litter, leaves, straw, or combinations of these or any materials which will form a light, loose covering.

The mulch can be applied any time after the early frosts. Some home owners prefer to make the application when the fall cleaning-up is done, but as a rule it is best to wait until the ground is slightly frozen. A covering of 2 to 3 inches deep, according to the density and

nature of the material used, is usually enough. No covering should be thick enough to exclude the air entirely. When leaves are used alone they will, if piled too deeply, have a tendency to pack and heat, thus causing more harm than good. In the forest, where nature provides her own protective covering with the leaves, the earth is gradually and evenly covered, as the leaves slowly fall and shift themselves about. Mulches that completely shut out the air are as disastrous as ice sheets. Any material that is apt to blow away should be held in place by using light boards or small branches.

#### WINTERING ROSES

The main winter need of hybrid tea roses is protection against the drying out of the stems. The best agent to supply this protection has been found to be the earth itself. By bending the rose plant over as far as possible without breaking it and then securing it in this position, it is possible to bring the earth up about it. The plant should be practically buried to a depth of 6 inches, using the soil in the bed or by adding additional soil, clay if possible. Over this apply a mulch of hay, straw, litter, or oak leaves to a depth of 12 to 15 inches.

For hybrid perpetuals, a 6 inch application of any protective covering of the same consistency as described for general purposes, is enough. In very severe climates, tender roses should be dug up bodily before freezing weather sets in; then laid in a well drained trench 2 feet deep and covered with earth. Replanting should take place as early as possible. In climbing roses, a protection about the vines of burlaps and straw, or some other desirable material, is often necessary.

#### REMOVING WINTER COVERINGS

The removal of the protective covering at the proper time in the spring is of great importance. Removing the covering from the plants before the danger of spring frosts is past, is liable to result in disaster. The first warm sun and wind will encourage an early and premature growth that is quite apt to be frozen off some chilly night. Leave the covering on until this dangerous period is past, then open it up to allow a fairly free circulation of air before removing it entirely. It is better to leave the covering on too long than to remove it too soon, but it is also detrimental to the plants to remain covered late into the season.

If there are no bulbs in the ground and a material that can be used as a fertilizer has been used for a mulch, then this can be worked in to the soil. Where bulbs are growing, the mulch should be lifted with a fork.

#### APPLYING FERTILIZERS IN SPRING

Springtime is the time to apply commercial fertilizers of the quickly soluble sort. Roots are active at this time, and the good of the fer-

tilizer is taken up before it is washed away. Fertilizers used to revitalize old shrubs or trees, or to create flower growth in perennials, or as a lawn dressing, should be applied at this time.

#### CULTIVATING THE SOIL

The summer care of shrubs and flowers is also very important as this is a time of extreme trial, on new plantations. The soil in the bed or border should be cultivated, giving it the same treatment that would be given a garden in which one was raising prize vegetables. After the soil has become packed from rains or from watering, cultivation should be done as soon as the ground has dried out enough to be worked easily. The purpose of this is to keep the ground loose about the roots and to preserve the moisture in the soil. Surface cultivation provides a layer of finely pulverized soil through which the natural capillary action of water in the soil is discouraged. The fine earth acts as a mulch of the simplest form and thereby discourages evaporation.

The sight of the bare ground is objectionable to some degree, but if the beds are kept neatly edged and the cultivation is done uniformly, the appearance of the border will not be as bad as it might seem. The good that is done should more than offset this objection.

#### WATERING

Watering is advisable mainly as an emergency measure. The ground should not be sprinkled, but should be soaked until it will not take up any more water. When it is possible to dig small ditches about the plants, these can be filled and refilled with water until the moisture has penetrated to a depth of several inches; then the trenches can be filled with earth.

When sprinklers are used they should be of a type that bring about an even distribution of the water. There are various standard systems that will accomplish this. A simple way of watering lawns is to lay the unnozzled hose on the grass, allowing a steady stream of water to flood the ground. If the water does not run off, the hose can be left in one position as much as a whole night. Watering slopes will be greatly facilitated by punching holes into the sod and bank.

#### SUMMER MULCHING

The need for watering can be largely prevented by the use of summer mulches. A mulch is spoken of here as a layer of a material which will be of a consistency to discourage evaporation from the soil. The mulch may be finely pulverized earth, cut straw, hay, grass clippings, litter, or well rotted manure. Summer mulches should be applied before the extreme hot weather sets in and after a rain or watering.



## THINNING SHRUBBERY PLANTINGS

After a few years of growth the larger growing shrubs are apt to become overcrowded. When separate plants can be removed here and there without leaving large and conspicuous voids in the foliage mass, such judicious thinning is advisable. Often it is necessary to respace a number of shrubs if they are to appear well after thinning. When this is the case, those, which would be replanted in their same position, were they removed, should be determined and the others taken up. The few shrubs needed to fill the void, can then be replanted.

## RE-WORKING PERENNIALS PLANTING

When herbaceous perennials are planted in the border in front of shrubs it is often necessary to move them forward as the shrubs grow and spread out. With the exception of Peonies, Gas Plant, and a few others, most perennials are benefitted by being moved and thinned. Most perennials are such gross feeders that they rapidly exhaust the soil about them. It must be remembered that they are grown for foliage and flower and make heavy demands upon the soil. Some varieties have a tendency to develop large crowns and heavy root masses in a way which causes them to crowd themselves and others. By re-working the whole border, or parts of it, every 2 to 4 years, according to the growth, these evils can be corrected. The plants can be taken up and divided, then replanted in soil that has been replenished and fertilized. An opportunity for making a new and luxuriant growth is thus afforded.

## KEEPING THE BORDER ATTRACTIVE

No garden or border of perennials should be allowed to become overcrowded or too bare. Removal of a few plants, where they have become crowded, may entail a sacrifice, but it should be done.

Bare places are bound to occur at unexpected times and in unexpected places. If left unfilled, they are apt to ruin the appearance of the border. Where possible it is best to replace the plants that have died, with the same varieties. For emergency use and for general supplementary planting, annual flowers are the life savers. Many of the annuals can be sown directly in the place where they are to serve, while others can be moved in as needed. There is hardly a border that can present a good appearance throughout the season without the use of annuals. Many annuals can be moved from the nursery or service garden into the border in mid-season if the proper precautions are taken not to disturb the roots.

Flowers should be removed by cutting instead of by breaking. Flowers having gone to seed will appear unsightly and discourage further blooming if not removed.

## STAKING PERENNIALS

Many of the coarser growing plants have to be staked if they are to remain in an upright position. Staking is an art in itself. If improperly done it will appear unsightly. One stake, preferably green and inconspicuous, should be used for each branch requiring support. Never should the whole plant be bunched around one stake. The best material for tying the plant to the stake is raffia, which can be secured in light buff or natural color and stained green or brown if so desired.

## GARDENING HELPS

Every place that is large enough can make good use of a space set aside for a nursery and trial garden. Here cut flowers can be grown or experiments made with new varieties.

One of the most valuable assets of the garden is the compost heap. Into it should go all discarded vegetable matter that will rot and unite to form a rich soil full of humus. It is an all too common practice to burn leaves instead of putting them into the compost heap. Alternate layers of soil or sod and manure, when composted, will form a good soil. When considerable vegetable matter is used, an occasional forking over will assist in its decomposition.

## WINTERING WATER LILIES

Remove the tender lilies from the pool before killing frosts have set in. Remove the leaves and store the tubers in pots of damp sand at a temperature of from 50 to 60 degrees or pot them and keep in water at a temperature of 50 degrees. The hardy lilies may be left in the empty pool if the latter is filled with leaves and covered with boards or boughs.

## SPRING PLANTING OF LILIES

The hardy varieties of water lilies may be set out any time from April to August. The earlier the planting is done the longer the flowering period will be. The tender varieties cannot be safely set out until the water has reached a temperature of 70 degrees. In planting, sink the plants 3 to 4 inches deep in the mud and cover with a small stone to keep them from floating to the top. Oftentimes it is worth while to cover the mud with a layer of sand or fine gravel 2 to 3 inches thick, to keep down the manure and the soil. A good soil for water lilies can be made by combining equal parts of any good garden soil and well rotted cow manure.

## CARE OF POOLS

Cement pools should be drained in the fall, for water freezing in them is likely to crack the walls.

To keep mosquito larvae from developing in the pools it is necessary to stock them with fish. For small pools, gold fish are the best, for they not only feed on both eggs and larvae, but in their bright colors, are attractive in themselves. For large ponds, the native fish, such as minnows, sunfish and sticklebacks are best.

A common nuisance encountered in most pools or ponds where the water is still, is the development of algae. The algae are simple-celled plants that float around in the water giving it a greenish or reddish cast. An application of copper sulphate at the rate of one pound to a million gallons of water will destroy it in most cases. Application in large ponds or lakes is made by fastening a bag containing the chemical to the end of a boat, then rowing the boat around the pond. In a small pool simply fasten the bag of sulphate on the end of a pole and work the pole around through the water until the salts are dissolved. In concrete pools the fish should be removed when a chemical is used to destroy the algae. Red-bellied minnows and the tadpoles of toads are said to eat and destroy algae.

#### CARE OF LAWNS

In the spring the ground should be firmed by rolling several times. On a day when rain is anticipated, an application of equal parts of sifted wood ashes and ground bone meal at the rate of 5 lbs. per 100 square feet will provide a splendid top dressing. A little good garden loam mixed with the fertilizer will bring good results.

It is better to mow often with the knives set high than to allow the grass to become long, and then to cut it close to the ground. As a rule the knives should not be set less than 2 inches high. Lawn clippings should generally be removed if they are long; otherwise they may be left to lie upon the ground where frequently they are beneficial as a mulch.

#### WEEDS IN LAWNS

Weeds are prevented to a considerable extent by using clean seed, and manure that has become thoroughly rotted. The weeds that come up at first can be kept back and killed in many cases by frequent mowings. When hardy weeds like the dandelion get a start, the only satisfactory way of getting rid of them is to grub them out. A long knife is the best tool, and as much of the root as possible should be removed. Fill the holes with good soil and scatter seed on the bare spot. A good vigorous stand of grass will eventually crowd and kill out most of the weeds by the formation of a dense mass of surface roots.

## CHAPTER V

### PRUNING

**T**HE purpose of pruning is to produce a new growth, either of flower or foliage; to control or guide the shaping of the plant; and to remove broken or diseased parts. Have a definite and useful purpose as the object in all cases. Do not prune while the sap is running in the spring or so late in the summer that new growth will not have a chance to ripen off before winter.

#### HOW PRUNING AFFECTS THE GROWTH OF PLANTS

To do pruning intelligently one must understand the tendencies of growth in plants and the resultant effects of different types of pruning.

In deciduous material, all wood growth comes from buds that form at the ends or sides of the branches. The dismemberment of terminal buds stimulates the growth of the lateral buds. Removal of lateral buds will stimulate the growth at the tips of branches. The severing of a shrub branch below the lowest developed bud will cause the branch either to die or send out new growth from adventitious (newly formed) buds. Cutting off branches close to the ground encourages growth from the base or crown.

#### IMPLEMENTS FOR PRUNING

There are various styles and sizes of pruning shears and knives available. Any dealer will assist in choosing implements for pruning if the purpose for which the tool is to be used is mentioned. For ordinary work a pair of light shears is all that is needed.

#### PRUNING SHRUBS

In cutting the branch, the cut should be made above the bud as shown in the diagram. (Fig. 7). Newly planted shrubs should be watched to see that the strength does not all go into one or two shoots. A heavy bushy growth should be encouraged. In pruning all shrubs which are not purposely used for formal effects, care should be taken to preserve the natural grace and form of the plant. A tendency quite frequently exhibited by care takers is to go about trimming off the ends of all branches until in their appearance the shrubs resemble a series of dense and irregular mounds, entirely devoid of that gracefulness and play of light and shadow revealed in the natural growth.

## PRUNING TO PRODUCE FLOWERS

When pruning is done to create flower growth, it has to be done at the proper time to accomplish its purpose. Fall blooming shrubs, such as *Hydrangea paniculata*, should be pruned in the late fall or early spring. Spring flowering shrubs should be pruned directly after the flowering period has passed.

## PRUNING ROSES

For border or lawn roses the pruning after the first year should consist of removing diseased or dead wood, or weak and crossing branches. It is better to remove whole branches where necessary rather than to make a practice of cutting off the ends. Most of the roses of this type are benefited by having the whole top cut off every five or six years. By doing the pruning in the spring it is possible to leave the attractive hips to brighten the planting through the winter.

In pruning cut-flower roses, the number and size of the blossoms desired will determine the method of pruning. Severe pruning must be practiced for the production of individual blossoms of great perfection and for continuous bloom. Severe pruning of hybrid perpetuals consists of cutting them back to four or five eyes. To get a great mass of bloom in roses of this variety, only one-third to one-half of the shoots should be cut away. Teas and hybrid teas should be pruned in the same manner as described for hybrid perpetuals except that in cold climates they should be trimmed later in the spring and about the time the growth starts. China and Bengal roses should not be cut quite as closely as the teas. Bourbon roses prefer summer pruning. Only one-half of the shoots should be removed. In severe climates there should be only a partial pruning in the fall. Where the winters are mild the pruning can be done in the fall or early spring. In all varieties the weak and crossing branches should be removed every year.

## PRUNING CLIMBING ROSES

Climbing roses require special pruning to get an even balance between the old wood desired for foliage and the new wood desired for flower production. Hardy climbers and the Wichuriana type should be pruned just after blooming. Growth of the young shoots at the base should be encouraged at this time by cutting out the old wood.

Where more than one season's growth is required for the rose to cover a trellis, the old shoots should be cut off at the ground and the others shortened from 3 to 6 feet, depending upon the previous yearly rate of growth. In roses of this type a few vigorous branches are more desirable than weak ones. It should be constantly remembered that on the new growth depends the production of the flowers of the following season.

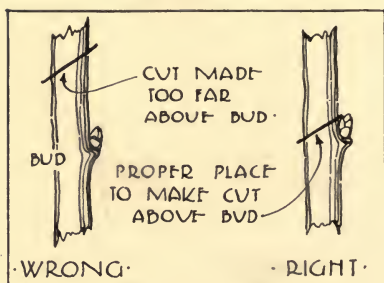


Fig. 7

### HOW TO REMOVE BLOSSOMS FROM ROSES

Care should be used in cutting blossoms from roses or the blossom producing properties of the plant may be injured, especially in the perpetual blooming varieties.

When a rose is cut from a plant of this sort or from tea roses, there should be left only one or two eyes of the current season's growth. By doing this the roses will be given very long stems. Sacrificing so much of the plant should not be regretted if the object is the production of blooms.

### PRUNING EVERGREENS

\*"Many evergreens are spoiled through a mistaken idea of beauty, by having their lower branches cut off. A long, naked stem is thus formed which is very distasteful to intelligent evergreen planters. An excellent way to preserve a perfect shape is to extract the center bud from any shoot that projects beyond the proper limit."

"Most of the upright juniper, hemlock, arbor-vitae and cedars are benefitted by an annual pruning in early spring or late summer, which causes them to improve in appearance. If the leader or main stem of an evergreen is destroyed by accident or otherwise, a new one may be readily formed by tying up a side branch in as nearly upright position as possible. Two leaders should never be allowed to remain; the stronger should be selected and the other cut away as soon as discovered."

### CLIPPING HEDGES

Hedges become just what they are made. If one wants a dense mass of foliage of formal line he should prune in the proper way to acquire such sculptural exactness.

\*From extracts from a paper by A. H. Hill, appearing under the heading, "The Care of Evergreens," in the American City, July, 1916.

The shape of the hedge should be influenced by the nature of the plant. As a general rule the sides of the hedges should be made to slope toward the top enough to prevent the overlapping and shading that would result if the hedge were wider at the top than at the base.

In deciduous hedges, quite constant clipping when the wood is small and soft encourages the formation of the dense mass of foliage which is so desirable. The strong growth that follows heavy rainy periods should be severely cut back. Hedges that have gotten out of bounds may often be restored by cutting them back a little at a time for three or four years. Evergreen hedges need just enough clipping to keep them within bounds and to restore their shape.

#### CARE OF TREES

Trees are one of our most valuable assets. This value cannot be thought of in terms of dollars and cents, for no amount of money can restore a tree that has been destroyed. In the unlimited services trees perform for us, they rightfully deserve every consideration for their health and protection. Many tree troubles require the attention of a specialist, who is able to supply the proper remedy. Trees should be protected by wire netting and stakes if there is any danger of their being damaged by traffic or animals. The lawn mower should be kept away from the tree to prevent injury to the bark. Broken bark paves the way for diseases which may in time destroy the tree.

#### TREATING BARK INJURIES

When the bark of the tree has been injured, it should be given prompt attention. First cover the wound to keep it from the sun and wind until the material to dress it can be secured. Mr. Elbert Peets, in his book, "Practical Tree Repair", states, "For fresh wounds, nothing is better than soft or liquid grafting wax. A mixture of clay and cow-dung is the second choice, with shellac and paint to choose from, if neither of the preceding is at hand." "In preparing the wound for dressing, all the loose bark must be cut away with a sharp knife, care being taken to cut into the wood as little as possible. Be sure all loose bark is removed. Test by pressing with fingers to see if bark is firmly attached to wood. Mr. Peets quotes Prof. L. H. Bailey, stating, "Pure white lead and linseed paint makes a very good dressing for moderately small wounds, especially if the wood is dry when the paint is applied."

#### PRUNING TREES.

From the number of bad examples one sees, it would seem that the common idea of how to cut off a limb is to do it any old way. The usual method is to leave a stub, which will in time start rot and disease in the tree. Branches should be cut off as shown in the accom-

panying drawing. (Fig. 8). After the branches are cut off the wound should be covered immediately by applying a coat of shellac or white lead and oil. All broken branches, dead and useless wood, should be removed from the tree.

#### RAISING OR LOWERING THE GROUND ABOUT TREES

In grading operations it is often necessary to raise or lower the ground about the tree. There is no way of being absolutely sure that the tree will live if the grade is changed, but if the the best care is given many good trees can be saved from destruction.

If there is to be a fill about the tree the first step would be to plow the surface soil if it has become at all hard. This is done to facilitate the passage of water to the roots, which will be much farther below the surface after the grading is done. The filling over the tree should be of light open soil, for heavy clay would be apt to shut out the water supply. If the fill is over 6 inches deep the soil should be kept away from the tree by surrounding it with a retaining wall built  $1\frac{1}{2}$  or 2 feet away.

If the ground is to be lowered about the tree, the slope from the old grade to the new should not start nearer the tree than the tips of its branches, if the roots are to remain undamaged.

#### WATERING TREES

The most effective way of watering trees is to supply the water in a fair quantity at the ends of its roots, where it is needed. The ends of the roots are said to be as far away from the trunk as the end of its branches.

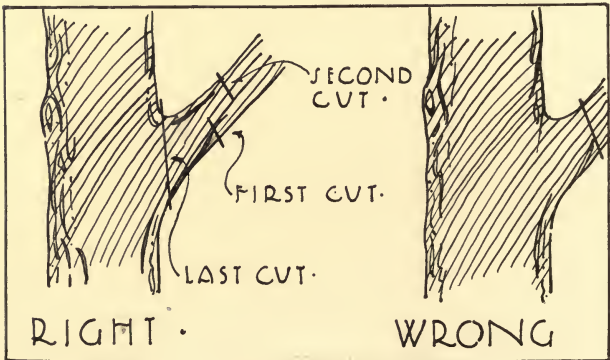


Fig. 8



One or two lengths of 4 to 5 inch porous tile buried upright in the ground with the top of the upper tile flush with the surface, will provide a receptacle for receiving and distributing water to the roots. Two or three of these properly spaced are enough for the average large tree. Rocks are sometimes used in the place of the tile.

Tree roots will naturally seek a source of moisture. When tile drains are laid near trees it is necessary to use vitrified, bell-jointed tile with cemented joints to keep the tile from becoming infested with roots.

#### HOW TO STIMULATE GROWTH IN OLD TREES

New life can sometimes be given old trees by supplying concentrated plant food. Bone meal is good for this purpose and is applied by pouring it into holes about one inch in diameter. Sometimes the sod is lifted up and the fertilizer applied beneath it. Apply the fertilizer at the root tips. Charges of dynamite are sometimes set off to break up the soil about the roots, but this is a dangerous practice unless the handling of dynamite is thoroughly understood.

## CHAPTER VI

### INSECT ENEMIES AND FUNGOUS DISEASES

**S**TRONG, healthy plants are much more apt to be immune from disease than their weaker brothers. By providing that care and attention which will create a flourishing growth in plants, there is a good chance for a clean bill of health. But trouble will sometimes come, appearing suddenly when least expected. In some cases, much of the disaster is done before the presence of the enemy is realized. By understanding the nature and symptoms of trouble, it is possible to give prompt and efficient treatment.

In combating pests and diseases, the one wise course is, first, to determine the nature of the trouble, and second, to use the proper materials and methods for effective results. There is no cure-all treatment applicable to all troubles.

The enemies of plants are of two sorts, insects which feed upon the substance of plants, and fungi. The insects are more easily recognized and combated than fungi, for a fungous disease comes from the growth of invisible spores and generally its victim is fatally stricken when the presence of the disease becomes known.

#### INSECTS

When insects attack, the first thing to do is to determine whether they are of the sucking or chewing kind. The biting insects are easily recognized, if they are carefully observed, as their jaws can be seen to work and there will be tell-tale holes in their path. Many of the beetles, weevils, grasshoppers, all true locusts and most larval forms (commonly known as worms, grubs and maggots) belong to the class of chewing pests.

The sucking insects have a sucking beak which they thrust down into the plant wherever they can easily suck out the vital plant juices. The injury they do is not so apt to be apparent for some time and for this reason they are likely to do a great deal of harm before being noticed. All true bugs, all the scale insects, and all the plant lice, or aphids, belong to this class of sucking insects.

A practical means of sure death for sucking insects is the use of a contact poison. A contact poison is one that kills the insect by coming in contact with its body. Poisons on the plant do not affect sucking insects in the least. The contact poison is applied as a spray; and every twig, leaf and branch must be thoroughly gone over to bring the poison in contact with every insect.

The chewing insects are more easily combatted than the sucking kind. They are destroyed by direct poisoning, that is, by poisons applied to the plant and swallowed by the insect. The arsenical compounds are used for this purpose.

#### FUNGOUS DISEASE

In plants affected with a fungous disease there are often distinct marks or spots upon the leaves or stems, a gradual weakening or death of the part, and in many cases a complete dropping of the leaves. In the course of the disease the parts affected take on a mildewed or rusty appearance. In woody plants the presence of fungous disease in the form of heart-rot may not be readily revealed. Bracket or shelf-like fungous growths on the sides of trees indicate the presence of disease and the need of special treatment. It does no good to remove the growth from the bark, as it is purely the fruiting (spore-bearing) body, and not the real source of the trouble that is removed. A specialist in tree diseases should be consulted.

Many fungous troubles can be controlled and dispelled by severing and destroying the affected parts and by promptly removing any traces of plants that have been diseased. Leaves dropping from diseased plants should be raked up and burned. Spraying with suitable fungicides is practiced in preventing and combating many fungous diseases.

#### APPLYING REMEDIES

Most insecticides are applied wet as sprays. There are a few forms, however, that are used dry in the powder form. Spraying is done by means of any machine that will force a liquid into a spray. Dealers offer any number of forms, both small and large, from which one can make a selection suitable to his needs and purpose. Dry powders are applied with a blower or bellows if an even distribution is desired. Usually a tin duster, which is nothing more than a tin pail with a perforated cover, will do. Spraying is more reliable than dusting, as a spray is not so easily washed off by a rain.

## A FEW COMMON TROUBLES AND THEIR REMEDIES

INSECT OR DISEASE	HABIT AND VICTIM	TREATMENT
<b>*APHIS, PLANT LICE, or GREEN FLY, and BARK LICE</b> —Small insects of various kinds.	Feed on young growth of roses and many other plants.	Nicotine and kerosene emulsion. Two or three applications several days apart will be necessary to get the plants clean. Avoid shade, dryness and crowding.
<b>BLISTER-BEETLE</b> —Soft shelled, long necked or gray spiny beetles.	Feeds on leaves of many trees and garden plants	Spray with arsenicals.
<b>CUTWORM</b> —Soft brown or grayish worms about an inch long.	Feeds on roots, crown, and even on tops of plants.	Poison bran placed near but not against plant. Arsenicals sprinkled on bunches of clover or fresh grass which are placed at intervals about the garden towards evening. Trap in holes which are made with a pointed stick beside the plant.
<b>WIREWORMS</b> —Slim brown worms (larvae of the click-beetle or snapping-beetle.)	Great numbers attack roots of plants. More apt to appear in hot, dry soils.	Arsenites sprinkled on little piles of fresh clover.
<b>ASTER BEETLE</b> —A black beetle appearing in large numbers.	Attacks asters and members of the composite group.	Arsenate of lead (strong) or Paris Green. Quick work is necessary to save the plants.
<b>*RED SPIDER, or MITE</b> —A small but pestilent invader, reddish or light colored and two spotted.	Attacks roses and ornamentals. Flourishes in hot, dry atmospheres.	Wash off with forceful stream of water or spray with soap suds. Repeat.
<b>ROSE BEETLE</b> —Resembles a fire fly. Appears in swarms as roses are about to blossom.	Tears and devours the rose buds.	Spray with arsenate of lead or Paris Green. Supplement spraying with hand picking into a can of kerosene and water.
<b>*SCALE-INSECTS</b> —Small insects characterized in one stage by a stationery scale-like appearance.	Inhabits branches and twigs and sometimes the fruit of trees.	Use Lime-sulphur or miscible oils. Spray young insects while migrating in spring, with kerosene emulsion.
<b>*SAN JOSE SCALE</b> —A scale nearly circular in outline and about the size of a pinhead.	Attacks fruit trees and some ornamentals.	Spray thoroughly in fall after the leaves drop or early in the spring before growth begins, miscible oil or lime-sulphur wash.
<b>LEAF ROLLER</b> —A caterpillar, brownish or greenish, which rolls up in fresh green leaf.	Attacks roses.	Pick off and destroy.
<b>RUST or LEAF SPOT</b> —Yellow spots on leaves.	Attacks roses.	Remove and burn affected parts. Spray with Bordeaux mixture.

\* Sucking Insects.

INSECT OR DISEASE	HABIT AND VICTIM	TREATMENT
MILDEW—White spots on leaves from prolonged damp weather.	Attacks roses and other ornamentals.	Spray with Bordeaux mixture in early stages or sprinkle powdered sulphur upon the leafage and upon the earth about the plants.
BLACK-SPOT—Appears in full grown rose leaves as black spots and very quickly covers the leaves	Attacks roses.	Pick diseased leaves off of plant and spray with Bordeaux mixture.
BORERS of various kinds.	Make tunnels in wood or bark.	Dig out or use carbon bisulphid (inflammable, use with caution). Woodpeckers are the natural enemies of borers.

\*INSECTICIDES AND FUNGICIDES

1. Fungicides for fungous diseases.

†BORDEAU MIXTURE

Stone Lime.....3 tablespoonfuls.  
 Copper sulphate.....2 tablespoonfuls.  
 Water..... 2 gallons.

The copper sulphate should be dissolved in a gallon of water. Add a gallon of water to the lime (after slaking) and mix the two solutions. Bordeaux mixture may be added to and applied with arsenate of lead.

LIME-SULFUR

(for trees in foliage)

Lime-sulfur concentrate (33° B).....1 pint.  
 Water..... 1 gallon.

(for dormant trees)

Lime-sulfur concentrate (33° B).....1 pint.  
 Water..... 1 gallon.

Equal parts of dry lime and powdered sulfur are often dusted on plants for surface mildews.

2. Insecticides for sucking insects. (contact poisons).

KEROSENE EMULSION

Kerosene (coal oil).....1 quart.  
 Soap ..... 1 ounce.  
 Water .....2 quarts.

After dissolving the soap in the water and emulsifying add 12 quarts of water.

\* Mixtures can be compounded in larger or smaller amounts at same rate.  
 † Can be bought ready-mixed.

## LIME-SULFUR

(See Fungicides)

## NICOTINE

Water .....2 gallons.  
 Tobacco stems or dust.....1 pound.

Boil stems or dust thoroughly, then strain and add enough cold water to make two gallons of liquid.

## MISCIBLE OILS

Commercial brand.....1 part.  
 Water .....15 parts.

Use only on dormant plants as winter spray when temperature is above freezing and trees are not wet.

## SOAP SUDS

Soap ..... $\frac{1}{4}$  pound.  
 Water ..... $1\frac{1}{2}$  gallons.

Dissolve soap in hot water and add water at above rate.

## 3. Insecticides for chewing insects. (stomach poisons).

## ARSENATE OF LEAD

Lead arsenate (powdered) .....1 tablespoonful.  
 Water .....2 gallons.  
 or  
 Lead arsenate (paste).....2 tablespoonfuls.  
 Water .....2 gallons.

Arsenate of lead is displacing Paris green as an insecticide as it has better sticking qualities and can be seen on the leaves.

## PARIS GREEN

Paris green..... $\frac{1}{2}$  teaspoonful.  
 Water .....1 gallon.

## HELLEBORE

Hellebore.....4 ounces.  
 Water ..... $\frac{2}{3}$  gallon.

An ounce of glue or thin flour paste is sometimes added to make it adhere.

Powdered white Hellebore may be applied pure in a dry state or mixed dry with a little flour to make it more adhesive.

## BRAN ARSENIC MASH

White arsenic.....	.01 pound.
Bran .....	1 pound.
or	
Paris green.....	.02 pound.
Bran .....	1 pound.

## VEGETABLE BAIT

Spray fresh mown clover or other plant that insects will eat with Paris green or other arsenical; place while fresh in small piles around infected plants. Covering bait with shingles will help to keep it fresh.

## CONCLUSION

The pleasures of planting and caring for plants have been outlined here in a utilitarian way devoid of the real spirit that accompanies those activities. It remains for the home owner to find out the pleasure of the successes and failures in gardening. The joy of it all is there, however, and any gardening enthusiast will endorse this statement.

It is in the evolution of the growth of plants wherein lies their mystery and interest. The gradual unfolding and development of plants makes them a perfect medium for the expression of beauty and composition. Everyone should remember the importance of this evolution. When the place is first planted, whether by owner or professional, the work has just begun. The yearly change will reveal new needs that should be satisfied and new opportunities for greater attractiveness and satisfaction. Wherein can be found a better opportunity for continued personal expression and interesting endeavor than in the grounds about the home?





“They set great store by their gardens. . . . Their studie and deligence herein commeth not onely of pleasure, but also of a certain strife and contention . . . concerning the trimming, husbanding, and furnishing of their gardens; everye man or his owne parte.”

—Sir Thomas More.









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