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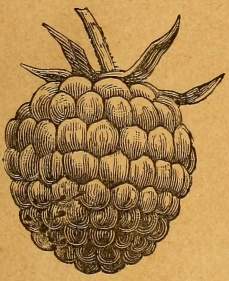

PRACTICAL FRUIT GROWER.

BY

PROF. S. T. MAYNARD.

SPRINGFIELD, MASS.:
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1886.

American Agriculture.

THE

PRACTICAL

FRUIT GROWER.

—BY—

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PROFUSELY ILLUSTRATED.

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PREFACE.

In this age of book-making, a new book should not be urged upon the public unless to supply a real need. My excuse for presenting at this time this little volume, is the want, on the part of beginners in the business of fruit culture, and of the common farmer who has not the time nor inclination to study extensive works upon the subject, of a book that shall be sold at a small price yet cover the entire field of fruit cultivation, in all its details, in a plain and practical manner. The limits of the present work, however, will not allow of an extended discussion as to the merits of the many methods of growth and cultivation, and I have aimed to give only such as are largely practiced by the most successful fruit growers.

S. T. MAYNARD.

Massachusetts Agricultural College,
Amherst, Mass., 1885.

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CHAPTER I.

THE APPLE (*PYRUS MALUS*).

VALUE OF—ORIGIN—IMPROVEMENT BY HYBRIDIZATION AND SELECTION—ESSENTIAL QUALITIES.

VALUE OF THE APPLE.—This most ancient and important fruit of the temperate zone is found and grows successfully wherever civilization exists. It is largely cultivated throughout the whole of Europe, portions of Northern Africa, Northern Asia, China, Japan, Australia, South America, and in North America from Alaska to Florida. The product of the Apple crop in a single year in the United States alone has reached the enormous amount of over 50,000,000 bushels, and more than 1,000,000 acres are planted with Apple trees. Aside from the value of its fruit, the wood is very valuable for making weavers' shuttles, and for other purposes requiring hard, close-grained wood.

ORIGIN.—The fruit we now enjoy is so entirely unlike the original type of the species as to be hardly recognized as belonging to it, yet when the specific test is applied, *i. e.*, that of its reproduction from seed, we find that the seedlings, even from the most improved varieties, soon revert to the original form. It undoubtedly originated from the wild crab of Middle and Northern Europe. The type of the wild crab is seen in many of the wild seedlings common in neglected pastures throughout the United States, the fruit of which is hard and often acid, and the branches often tipped with sharp thorns.

The improved varieties now in cultivation are the result of the influence of improved condition of soil, climate, etc. Many of, or, I might say, most of the best varieties known to us, are chance seedlings, or sports, as they are called. No one can tell whether they resulted from crossing by natural fertilization or from a change in the germ due to superior surroundings of plant food and climatic influence.

IMPROVEMENT IN VARIETIES.—In considering the various subjects of improvement of varieties, methods of propagation, cultivation, pruning, etc., it will be my aim to deal in general

principles, so that, for economy of space, the subject may be referred to again when necessary without repetition.

Hybridization.—Very little attention has ever been given to the production of new varieties of the Apple by crossing, or hybridization; a method which, in the case of some other fruits, has resulted in very marked progress in the improvement of varieties. Perhaps it may be of interest to those experimentally inclined in this direction to describe the process. This is performed by taking two flowers (and the process is the same with all fruits) of desirable varieties,—as, one a strong, rampant grower, while the other produces fruit of remarkable quality; removing the stamens from one flower before it opens, and, after this operation, inclosing it in a fine gauze bag. When the pistil of this flower is in the proper condition, *i. e.*, when the end of the stigma is covered with a viscid fluid, the pollen from the other flower is applied to its surface, and then again inclosed in the bag, until certain that fertilization has taken place.

Selection.—Another method which promises good results is that of selection; that is, by sowing the most perfectly developed seed of the best varieties. By either of the above methods, there is but little incentive to the production of new varieties of Apples or Pears, on account of the long time required to produce fruit and to test its value in many localities, and the small money value in a new variety to the originator. Whatever is done in this line must be done for posterity and from a love of the work, but, I believe, there are great possibilities of improvement in the future in the light of the improvement of the past.

The best results have always come from the use of the most hardy native kinds, although the introduction of new blood, as it is called, is often marked by a wonderful improvement in the progeny. If a variety has marked failings, they are liable to be transmitted, although, in some cases, they may be overcome or covered up by the strong or valuable qualities of the other parent in the case of hybridization.

Important Qualities.—The qualities that are most important in a new variety are: *Hardiness, vigor of growth, productiveness, and fine quality.* Without the three first, the last quality is of little consequence; because, with the people, cheap fruit in abundance is the great want, and will add greatly to their health and, consequently, to their happiness.

CHAPTER II.

PROPAGATION OF THE APPLE.

APPLE SEEDLINGS—TO GET GOOD SEED—THE SEED BED—APPLE SEEDS—PRESERVING SEEDS—ROOT GRAFTING—CARE OF ROOT GRAFTS.

The varieties of Apples are propagated by budding or grafting upon seedlings. The seedlings used for stocks are most commonly grown from seed obtained from the pomace of the cider mills by washing. While some good seeds may be obtained in this way, the majority must be imperfectly developed, as most of the fruit used for making cider are the wind-falls and those injured by the codlin moth. To obtain good seed, the fruit of strong native trees should be selected. The fruit may be ground up for cider and the seeds then separated, or the Apples may be planted whole. Some of the best seedlings I have ever grown were from seed planted with the whole apple in the fall.

THE SEED-BED.—The soil for the seed-bed should be deep and moist, and made rich by the addition of an abundance of well decomposed manure, or ground bone and potash. New soil will grow much better seedlings than that previously cultivated for several years. It should be broken up and planted with potatoes one year, or until it gets mellow. The first year after turf land is plowed there are many larvæ in the soil that feed upon the young roots of the seedlings and greatly injure them. If the seed is purchased from seed dealers, it is often difficult to get it in season for sowing in the fall. In such cases it must be preserved through the winter packed in boxes of sand and be kept in a cool cellar, as near freezing as possible; or, the box may be placed partly under ground, out of doors, where there is no danger of standing water, taking care that the sand does not get dry during the winter.

As soon as the ground will work up fine, the seed should be sown with the sand in drills 18 inches apart, and so that the seedlings will stand two or three inches apart. All of the weak and imperfect seedlings should be thinned out as soon as their character can be determined, and the soil be kept free from weeds and mellow. If the seed-bed was properly prepared and the seed

good, the seedlings should have made from one to two feet of growth the first season.

The seedlings may be allowed to remain in the seed-bed until the following spring and then transplanted to the nursery to be budded. If to be root-grafted, they should be dug in the fall and carefully packed in moss or moist sawdust, and kept in a cool cellar until wanted for grafting.

ROOT GRAFTING.—During the winter, when very little can be done out of doors in the nursery, such work as root grafting and making cuttings is done indoors. The seedlings, previously dug and packed in moss or sawdust, are taken as needed from the cellar and the cions grafted upon them at or just below the collar, *i. e.*, that part where the root and top joins. The kind of graft known as tongue or whip-grafting is illustrated by Figures 1, 2 and 3.

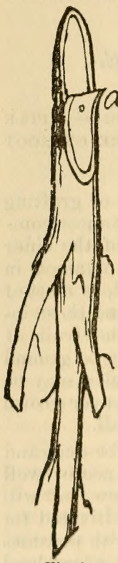


Fig. 1.

The stock (Fig. 1) is taken in the left hand, and such lateral roots as will interfere with planting are shortened and the lower end cut off if the root is more than eight inches long; six to eight inches is the usual length of the root. An upward, slanting cut is then made, with the tongue as at *a*. The cion (Fig. 2), a piece four to six inches long, of the last season's growth of the variety desired, and as nearly of the same size as the stock as possible, is then taken and a similar cut made at the base. The two parts are then pressed firmly together, and the union is bound firmly with waxed string or waxed cloth (Fig. 3). Some nurserymen prefer the string, which does not cover the entire surface of the cut, and others the band, which perfectly excludes the air and moisture. Cions should not be cut when frozen, but may be cut at any other time and preserved in damp moss until wanted for use.

After the root-grafts are thus made, they are packed in boxes of sand or light soil, and the soil very firmly packed around them, especially at the point where the graft is

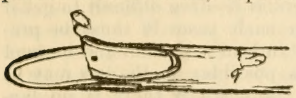


Fig. 2.

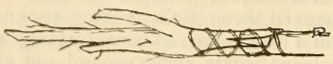


Fig. 3.

made. In the spring the root-grafts and seedlings are to be transplanted to the nursery.

CHAPTER III.

THE APPLE NURSERY.

SOIL—PLANTING—BUDDING—TIME FOR BUDDING—HOW TO BUD—UTENSILS AND MATERIAL EMPLOYED—POINTS TO BE OBSERVED IN BUDDING—NURSERY CULTURE—FORMING THE HEAD

SOIL.—The soil best suited for the growth of nursery trees should be deep, rich and moist, and be plowed to the depth of at least 15 inches. The seedling for budding should be dug as soon as the frost is out and the land will work mellow. After shortening the tap roots and some of the laterals a little, plant in rows four feet apart, and from six to eight inches apart in the row.

PLANTING.—After the land is thoroughly prepared and made smooth, a line is stretched and the seedlings (if the roots are not much branched) are planted with a tool called a dibble (Fig. 4). Where the soil is made mellow to a depth of more than one foot, seedlings, root-grafts, and cuttings may be very rapidly planted by the use of this tool. If the roots of the seedlings or root-grafts are much branched, they must be planted by opening a trench with a spade or plow, as deep as required to have the top bud just above the surface of the soil. The most important part of the operation of planting seedlings, root-grafts or long cuttings is that the soil be *very firmly pressed* about the lower ends. This may be done by the foot, or, much better, by the "tamper" (Fig. 5). This consists of a piece of two-inch plank cut with a base of about six to eight inches, and tapering up to three inches wide at the top, in which is inserted a hoe or fork handle.

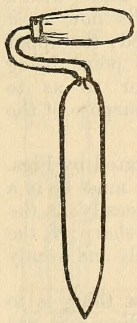


Fig. 4.

BUDDING.—After planting, the seedlings require very little care, except good cultivation and a little pinching to force the growth into one main stem, until August, when they are to be budded with the variety desired for the orchard or for sale.

The best time for budding the apple is generally the last of

August, although, if the growth of the seedlings is likely to mature earlier, by reason of drouth, leaf-blight, or insects, they must be budded earlier. Or, if the season is moist and warm, it may be done as late as September. Budding must be done before severe freezing, as that causes a thickening or maturing of the soft cells of the cambium layer of the bark, thus making the union of the bud and stock much more difficult and very uncertain of success. Before beginning the operation of budding, the stocks should be carefully prepared by trimming off all of the lower branches and leaves for three or four inches from the ground, so as not to delay the work of cutting and inserting the buds.

Fig 5.

The material used for tying may be the bast fibre obtained from the Russian mats that come around Russian iron. This is cut into lengths of from 10 inches to one foot, according to the size of the stock to be budded, and separated into thin, smooth bands of one-fourth of an inch in width. Cotton warp obtained from cotton factories is being extensively used in some nurseries on account of its greater strength. The material used must be such that it will not shrink upon being wet, nor expand or loosen when dry. The bands are used in a moist condition; which is preserved, while in the field, by putting them in a "wrapper"—a roll of cloth lined with a sheet of oiled paper.

The knife used must be sharp and with a thin blade rounded at the end, as illustrated by Fig. 6. The common shoe-knife, with a short blade, is now most generally used; the upper part of the point being rounded over so as to answer the purpose of the ivory blade of the old style budding knife.

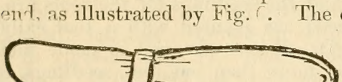


Fig. 6.

How to Bud.—The process of budding is illustrated by Figs. 7 to 11. The conditions of success are: 1, the stock must be in a vigorous growing state, so that the bark will peel easily; 2, the buds must be well matured; 3, the knife must be sharp; 4, the work must be done rapidly; 5, the buds must be firmly and evenly bound in place.

When everything is ready for the work, the first thing is to prepare a lot of bud-sticks (Fig. 7). Shoots of medium size are selected, taking care to get only those that have but one leaf at a joint, as where there is more than one leaf, there are generally one or more fruit buds. The leaves are cut off, leaving about one-fourth of an inch of the petiole or stem for a handle with which to insert the bud. The bud-sticks are kept from drying by using a wrapper, as for the bands. Where much budding is to be done, two persons are generally employed; one to cut and put in the buds, and one to tie or wrap them.

Where only a small number are to be budded, the operator carries the wrappers, both over the left shoulder, and with the knife makes first a cross-cut about two inches from the ground; then a longitudinal one on the north side, so as not to be injured by freezing and thawing in winter; at the same time raising the bark a little, as shown in Fig. 8. A bud-stick, Fig. 7, is then taken; with the knife a cut is made just through the bark about one-half inch above the bud, taking only a very thin portion of the wood. The length of the cut must be varied for the different kinds of trees. For the peach, the whole bud need not be much more than one-half of an inch long, while for the pear and cherry it should be at least one inch in length.

Fig. 7.

Fig. 8.

Fig. 9.

After the bud is cut, Fig. 9, the lower end is inserted under the raised bark of the stock and pressed down by means of the remaining part of the leaf stem, Fig. 10. If the bark does not peel easily enough to be raised by the pressure upon the bud, the stock is not in the best condition for success; and it may be necessary to raise it by the use of the rounded portion of the blade of the knife.

Fig. 10.

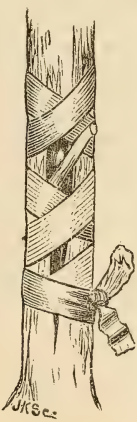


Fig. 11.

After the bud is in position, it is tied by holding one end of the band in the left hand, placing it against the stock, and winding the other end over the first, so as to hold it while both hands are employed to bind the bud smoothly and firmly; winding first upward, crossing above the bud, returning and tying below the bud, as shown in Fig. 11. The most important point in tying is to bind the bark down firmly and smoothly over the bud. After the trees have been budded a week or two, depending upon the condition of the weather, they should be examined, and if the growth is such that the bands are cutting into the stock so as to injure them, they should be

loosened and re-tied; or cut on the back side, if the bud is found well united with the stock.

The next spring after budding, the stock is cut off with a sharp knife, placing the blade on the side opposite the bud at the height of the cross-cut, and making an upward stroke, so that the knife will come out about one inch above the bud. When growth begins it will be found that the buds of the stock will start more vigorously than the one inserted, and when they are an inch or two long, they should be broken off, that the growth may all go with the inserted bud.

NURSERY CULTURE.—The after-treatment of the bud and root-graft, in the nursery, should be the same; the object being the growth of clean, healthy, well-formed trees. Only one shoot should be allowed to grow, and if laterals start out, they must be pinched off. At the end of the first season's growth, or before they start in the spring following, the stocks are to be cut back to the ground, and only one shoot allowed to grow, that a clean, straight trunk may be obtained.

FORMING THE HEAD.—During the summer of the second year, if the growth has been satisfactory, the head is formed. If the trees are to be planted where they must be kept cultivated, the head should be formed five feet high. This is a difficult thing to do, but the tree must be headed up as high as possible by rubbing off the lateral buds, as soon as they start in the spring, from three to four feet up from the ground, and then pinching the ends of the lateral branches above; leaving a clean leader in the centre, upon which laterals will be formed, as is shown by the dotted lines at *b*, Fig. 14, Page 15. The trees must have careful attention during the entire season if fine form is desired; and only those shoots should be allowed to grow that are needed to make a well-shaped head. A large amount of foliage should never be removed from any tree; and at this stage of growth, there should not be any necessity for so doing, if they have had proper treatment.

In the growth of fruit or any other kind of trees, it should be made a rule "not to cut away more wood or foliage than is absolutely necessary to accomplish the desired end, *i. e.*, the perfect-formed tree; for every cut upon a tree, whether large or small, can only result in weakness, although the injury may be more or less overcome by good cultivation and an abundance of plant food." If the trees are making a weak growth, indicating exhaustion of the soil, manure or chemical fertilizers must be used; but they should be applied late in the fall or early in the spring, as a late summer application often results in so late a growth of the trees that the wood does not get well ripened, and the trees are injured in the winter.

CHAPTER IV.

THE APPLE ORCHARD.

TREES FOR PLANTING—PROPER FORM, AGE AND SIZE OF TREE—THE LAND FOR THE APPLE—ESSENTIALS TO SUCCESS—LAYING OUT THE ORCHARD—THE PLANTING BOARD—DIGGING THE HOLES—MANURING.

TREES FOR PLANTING.—The best trees for planting are vigorous trees that have reached a medium size at the age of three or four years from the bud or root-graft. While a large tree is not desirable, on account of the number of roots that must necessarily be destroyed in digging, it has more vitality and will stand more ill-treatment and exposure than a smaller one. The fibrous roots of the young tree will be found within a short distance of the trunk; while in an older one they have been extending a little further each year, and when dug little else but the main branches are obtained. It is a good plan to obtain trees, of medium size, if they are purchased, one or two years before the time of planting and set them carefully in the nursery row eight or ten inches apart; or if the trees were grown upon one's own grounds, take them up and transplant them again before setting out. Trees in this condition can be moved with nearly all the fibrous roots and not receive much check.

If the planter has the necessary skill to grow up a tree to the proper form and height, after they are planted in the orchard, it would be much safer to plant stocky, low-branched trees; as a tall, slim one is liable to injury from the large surface exposed to a hot, drying atmosphere, after being removed from the shelter of the nursery. The training or "heading up" to the proper height is illustrated by Figs. 13 and 14, Page 15. For the majority of planters, until this skill is acquired, the nurseryman must grow the trees to the height adapted to orchard cultivation.

THE LAND best suited for the growth of the Apple is a deep, moist, sandy loam; but the Apple will give fair crops upon almost any soil, except a very sandy one.

Two methods of growth are in common use: The first where the trees are grown in turf; and second, where the land is kept under cultivation with some other crop. No matter what system

may be adopted, one thing must be constantly kept in mind, *i. e.*, that we cannot expect satisfactory results unless there is *an abundance of proper plant food and moisture in the soil in condition to be taken up by the roots of the trees.*

DISTANCE FOR PLANTING.—Trees of medium size, like the Early Harvest, Garden Royal, Fameuse, etc., should be planted thirty by thirty feet. Those that are kept in a close, compact form by heading-in may also be set the same distance. The larger kinds, like the Baldwin, Gravenstein, etc., if allowed to spread to full size, should be planted thirty-five by forty, or forty by forty feet.

LAYING OUT THE ORCHARD.—In planting an orchard, whether it is to be cultivated or not, it is advisable to have the rows straight and the trees at equal distances apart; not only for beauty, but for convenience in getting about among them. Perhaps the best way to do this is to use a long, hard-twisted cord or wire with marks at proper intervals upon it. The wire is much the best as it is not affected by wet or dryness, and will not stretch. This line should be stretched along two opposite sides and stakes driven at the marks upon it. Then stretch it from the opposite stakes, putting stakes at every mark, and it will be found that all are in line from every point of observation.

To lay out an orchard so that the stakes shall all be exactly in line is a very simple matter, but to plant the trees so they shall be equally true, is almost an impossibility, without the aid of something besides the eye. Two methods are sometimes adopted: The first, by using the same wire employed for staking out; and second, by what is known as the planting board. The objection to the first is, that it is in the way of the workmen in planting and is liable to be moved to one side or the other by only slight pressure.

THE PLANTING BOARD, however, is free from the above objections, and is illustrated by Fig. 12. It consists of a narrow board about four feet long, with a notch in the centre and one equally distant from this at each end. Before digging the holes, this board is placed with the centre notch against the stake and held firmly, while the stake is pulled up and put in the notch at one end, and another stake at the notch in the other end. The board can now be taken away and the hole dug, taking care not to disturb the two stakes.

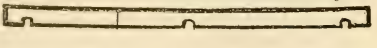


Fig. 12.

DIGGING THE HOLES.—If many trees are to be planted, it is best to dig as many holes during the middle of the day as can be filled with trees during the last two hours of the afternoon and the first two hours of the morning, as the roots will be much less liable to injury than if planted in the hot sun in the middle of the day. If the land is to be cultivated, the holes need be only large enough to allow the spreading of all of the roots in their natural

positions; their size must depend upon the size and kind of tree planted. If the trees are to be planted in turf, it will be advisable to dig the hole three to four feet in diameter and to loosen the subsoil somewhat. The surface soil should be thrown in a pile by itself, to be used for filling around the roots, and the subsoil in another pile, to be spread upon the surface.

If the soil is poor, it is necessary for success that some well rotted manure or fertilizer be put with the soil for filling in about the roots. This must be thoroughly mixed with the soil, or it may result in injury rather than benefit. If coarse manure only is at hand, it should not be used until the roots have been covered with two or three inches of soil, when it may be applied with safety. The amount to be used must vary according to the poorness of the soil and the strength of the manure, ranging from one to two shovelfuls of fine, well decomposed manure; or from two to four large handfuls of fine ground bone; or one to two handfuls of the prepared bone and potash, well mixed with the soil. Many people will blame the nurseryman because the trees they plant do not grow, when the main cause is in the fact that there is nothing in the soil to make them grow. One has as good a right to expect a good crop of corn from land with no fertilizing elements in it, as a good growth of trees in a similar soil. If some of the people who fail in tree planting from this cause,—and most failures do result from starvation of the tree,—could see the amount of manure used by the nurserymen and successful orchardists (and needed, too) to make their trees grow, they would cease to wonder why theirs do no better, and put the blame where it belongs.

CHAPTER V.

SETTING THE APPLE ORCHARD.

DIGGING TREES FROM THE NURSERY—PREPARING TREES FOR PLANTING—FORMING THE HEAD—PLANTING THE TREES—CULTIVATION—TURF CULTURE—SUPPLYING FOOD TO THE ORCHARD.

Digging the Trees from the Nursery.—To those who may have grown their own trees, I offer a few words of advice as to the best way to get the trees from the ground with the least injury. Nursery trees are best dug by three men; two with spades, and one to pull out the trees after they are loosened. The two men with spades first remove the surface soil down to the upper lateral roots, for a space of at least two feet from the trunk on each side; the spades are then inserted, the soil loosened, and the roots outside of the circle of soil removed are cut off. After loosening the soil, both spades are inserted, and with a lifting movement, the third man at the same time pulling, the tree is lifted with nearly all of the fibrous roots within the space of two or three feet. The trees should be thrown in piles of from ten to twenty-five, and covered with a mat or blanket. If not to be planted at once, they should be removed to near the place of planting and be "heeled in;" that is, the roots covered carefully with soil.

Preparing the Tree for Planting.—No matter how carefully the trees are dug, more or less of the roots will be destroyed or injured. As trees are often received from the nurseries, there is little to them but the top and a few stubs of roots. In this condition, there are a large number of buds on the top to be supplied with food and moisture from a small amount of roots. The consequence is that none of the branches make much growth; or, perhaps, evaporation is so great from the expanding buds and the large amount of surface of the branches exposed, that the moisture is dried out faster than it is supplied by the scanty roots, and the tree dies.

To remedy this condition, the top should be reduced in proportion to the amount of injury to the roots. The older and larger the tree, the more severely must it be pruned. The large roots, wherever injured, should be cut off smooth, as decay is much

more likely to spread from a torn than from a smoothly cut surface.

FORMING THE HEAD.—In cutting back the top of the tree to make a balance between the root and top, the formation of the head should be kept in mind and all shoots not needed to make a good head should be removed. The trees received from most nurseries are of two forms, with slight modifications, as illustrated by Fig 13, where the branches come out at the same point; and by Fig. 14, where the branches are distributed along a main axis. The objection to the first form is, that when the trees become loaded with fruit, they are liable to split down in the fork; while in the second case, there is no such danger. A good rule to follow is, to cut away all branches not needed to give the head a good form; and shorten all others from one-half to three-fourths, according to the amount of injury the roots had received in digging.

Fig. 13.

Fig. 14.

It often happens that the trees received from the nursery are headed two low, and require "heading up." This is accomplished by cutting away all but the leading shoot, as is shown by Fig. 13, D, and Fig. 14, A A A, where new branches will be thrown out from the lateral buds, as is shown by the dotted lines. To head trees up to six feet in height, often requires two or three years from planting. Trees with a tall trunk are more liable to injury on account of exposure to sun, and frost, and other causes, than those with a short trunk, while in the latter the fruit is more easily gathered.

PLANTING.—Having the holes dug, the trees pruned, and everything in readiness, the most important part of the work is now to be done. Only a few trees should be dropped at once, and these with the roots in the holes, that they may not be more exposed to the air than is necessary. Three men are required to do the work most rapidly; one to carry the trees, hold them in place, spread out the roots and press the soil in about them; and two with spades, one of whom carries the planting board. Perhaps ten trees have been dropped, when man No. 1. takes up the first tree, while No. 2. fixes the planting board with the end notches against the two stakes. No. 1 now places the tree trunk in the middle notch of the planting board and spreads the roots, while No. 3 is prepared to throw in some fine, rich, surface soil, which No. 1 works carefully in around the roots, treading it firmly in place. As soon as the tree is in its proper place, No. 2 throws his board to the next hole, and takes up his spade to assist in filling in the soil,

In this operation, the secret of success is to see that there are *no air spaces around the roots or under the collar*, and that *the soil is pressed very firmly around the roots.*

Cultivation.—The effect of stirring the soil after planting trees is: First, in preventing the escape of moisture by forming a layer of loose non-conducting material of the surface; and second, by hastening the preparation of plant food in the soil by the air admitted. In young orchards, if it is thought necessary to cultivate, it will be found most economical to grow some hoed crop among the trees for several years at least; but as a rule, such crops will not more than pay the cost of cultivation and manure used, while they often fall far short of this, and the owner must take his profit in the increased value of his orchard. Any hoed crop may be used that does not require cultivation late in the fall, for young orchard land should never be cultivated between August first and November first, as it is almost certain to prolong the growth of wood so that the trees will be in danger of injury from the winter.

Turf Culture.—In turf culture, the preservation of moisture in the soil must be gained by the use of mulch. Any material, as brush, brakes, coarse meadow-grass, straw, leaves, planing-machine shavings, etc., may be used; while the plant food must be added in some form at the time of planting the trees, or later upon the surface.

In nearly every state in the Union there are thousands upon thousands of acres of land so rough and stony that it cannot be cultivated, and upon which are often found apple trees remarkable for their vigor and productiveness. The fruit produced upon such land is noted for its high color and rich flavor, and for long-keeping qualities. Much of this land is almost worthless for any other purpose than forestry and the production of the large fruits; and if properly planted and cared for, it would in a few years give a large income for the investment. In planting such land, particular care must be given to the preparation of the soil directly around the tree, and to saving the material often found growing upon it,—such as sedges, brakes, brush, etc.,—or obtained elsewhere, to be used for mulch, to prevent the escape of the moisture that is rapidly carried away by the leaves of grasses and other plants.

The advantages claimed for this system are, that the trees mature their wood much earlier in the autumn, and consequently are less liable to injury from cold; the roots are protected from injury from the extremes of heat and cold, by the grass roots; the trees begin bearing much earlier and bear more regularly, the fruit is of better quality and keeps longer; the cost of land and cultivation is much less, while a satisfactory growth may be obtained by the use of a small amount of manure or fertilizer applied to the surface.

I wish to repeat here, however, what I have said on a previous page: Whatever system is followed, success will not be obtained unless an abundant supply of plant food be provided; and the cheapest and best method of supplying the above conditions must be decided upon by the good sense of the grower, according to his surroundings.

CHAPTER VI.

MANURING, PRUNING AND CARING FOR THE APPLE ORCHARD.

STABLE MANURE—HOW TO USE IT—FERTILIZERS AND THEIR APPLICATION—MULCHING—PRUNING—IMPLEMENTS FOR PRUNING.

STABLE MANURE is always good for fruit trees in limited quantities, but it may be used so as to cause harm instead of good. It should be applied sparingly to young trees, unless the soil is very poor or an exhausting crop is to be taken from the land, that will feed largely upon the elements that tend to produce a coarse, woody growth, *i. e.*, the nitrogenous elements. The best time to apply stable manure is in the fall—on land that will not wash badly—or very early in the spring. If applied in the summer, it causes a late growth that is very liable to injury and disease.

When the trees reach maturity, and are bearing exhausting crops of fruit, manure may be used more liberally, especially in the spring of the bearing year, for many trees are almost ruined by their effort to produce a very large crop of fruit, particularly should the season prove dry. Such trees are in the condition of the over-loaded and ill-fed horse, or the poor, over-worked laborer; they are all alike liable to the attack of contagious diseases. Trees that have been injured by over-bearing may be improved very much by the application of nitrogenous manure the non-fruiting year. The effect is to cause a large development of wood at the expense of the fruit buds. This illustrates a law that we find throughout all life, both plant and animal: That causes which increase the vigor of the stock or body, decrease the reproductive forces; while a decrease of vigor in the body or stock, gives activity to the powers of reproduction. Herein is a wise provision of nature for the perpetuation of species; for when the body or stock is vigorous, there is no necessity for immediate provision for the future; but when the body becomes weak, nature makes an unusual effort to perpetuate the species by an increase of the reproductive powers.

FERTILIZERS.—One of the greatest difficulties the fruit grower meets in his business is that of obtaining the necessary amount of plant food to produce satisfactory results. This problem is be-

coming in a measure solved in the large amount of chemical manures now being manufactured. Of those kinds best suited for the production of fruit, fine ground bone and potash are the best, with more or less nitrogen to produce a vigorous plant body. The best grades of bone contain sufficient nitrogen for most soils, but for very poor land it will be found necessary to use some nitrogenous compound like nitrate of soda, sulphate of ammonia or animal matter. For an acre of Apple trees (forty trees) over ten years of age, the following formula will give good results, varying the quantity of the elements used according to the kind of soil, and the crops, other than fruit, removed:

250 lbs. fine ground bone.
100 lbs. high grade (80 per cent) muriate of potash.
50 lbs. sulphate of ammonia or nitrate of soda.

If the soil is very poor, as indicated by the slow growth of the tree, more of the last element must be used; if the land is rich, and the trees are making too much wood, use only the bone and potash. The effect of the nitrogenous elements is to increase the leaf action of the plant; of the potash to cause a large development of starch and sugar; while the phosphoric acid of the bone causes a large development of the seed. For fruit alone, bone and potash are perhaps the best fertilizer that can be used.

As with stable manure, the best time to apply fertilizers is late in the fall or very early in the spring.

Mulching.—Without water in the soil, no fertilizer or manure will have much effect upon plant growth; and upon soils that are liable to injury from drouth, mulching in some form must be resorted to. In the cultivation of the soil, the fine, loose layer of soil on top, is a most effectual mulch.

Pruning.—The first year after the tree is planted it must have constant attention. It is like a child, and its first years of training determine its character or form. After the main branches have become fixed, as illustrated in Fig. 14, Page 13, all the pruning the trees require is to give symmetry and regularity to the head by pinching out the bud of those shoots that tend to outgrow the others, until the branches become liable to injury by crossing and rubbing together or until so thick as to interfere with ease in gathering the fruit. While young, the trees should be allowed to grow with a close head; for when they begin to bear, the weight of the fruit will bend down the lower branches enough to let in all the sunlight and air needed for the perfection of the fruit. The largest and best fruit is always borne upon those trees with the largest and most perfect leaf development.

Cutting of large branches should be avoided, as every blow made upon a tree is certain to shorten its life. It is generally known that cutting off a large quantity of branches, in the fall or winter, will cause a great increase in the size and quality of the fruit the following year. Consequently the farmer thinks he must prune his trees annually. But this increase is at the expense

of the tree to a certain degree, for the *number* of apples is diminished in proportion to the severity of the pruning and consequently, with the same amount of food and root force that the whole crop would have had, the remaining fruit is much increased in size. Had the labor expended in pruning been directed to thinning the fruit, or in the application of more plant food, there would have been a much greater gain in the crop of fruit and no loss in the vigor of the trees. But four good reasons can be given for cutting off large branches from fruit trees:

1. *To Improve the Form.*—It sometimes is the case that a tree becomes one-sided from the influence of prevailing winds, or other causes, when a little judicious cutting of branches may be necessary to rectify the trouble.

2. *To Enable Teams to Work under their Branches.*—The removal of large branches for this reason is sometimes necessary, but in most cases the desired end may be accomplished by cutting off the end at an upright branch, as illustrated at *a*, Fig. 15.

Fig. 15.

3. *To Enable the Pickers to Gather the Fruit Easily.*—As trees become older, especially if they have been subjected to the "annual pruning," suckers come out in large numbers upon the main branches, and make it very difficult to gather the fruit upon the inside of the tree. These suckers are the result of the effort of the plant to overcome the injury caused by the action of the sun and cold upon the bare branches, and should be thinned out only enough to accomplish the desired end, and to allow some of the most vigorous branches to develop more fully, and thus renew the tree.

4. *To Remove such Branches as are Dead.*—The removal of dead branches is best accomplished in the summer when the foliage is upon the trees.

When large branches must be removed, the wound should be covered with linseed oil and lead paint, or grafting wax, to preserve the injured part from decay until it has healed over. This paint may be made the color of the bark of the tree by the addition of

Fig. 16.

a little black, green and brown coloring matter. The condition of many of the apple orchards of the country is illustrated by Fig. 16, while the more perfect form is shown in Fig. 15.

Implements for Pruning.—For removing large branches, a

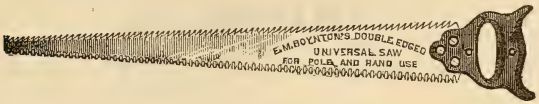


Fig. 17.

saw with a long narrow blade is best. Fig. 17 illustrates a very serviceable form. For heading-in branches that are outgrowing their neighbors, to the injury of the form of the tree, and to remove insects' nests and eggs, the pruning hook is very useful.

Fig. 18.

Fig. 18 illustrates the Waters' pruning hook, which is one of the best. A pruning knife is also necessary for the removal of suckers from the trunk, and for paring the wounds smooth when large branches are cut away.

CHAPTER VII.

GRAFTING THE APPLE.

AGE OF FRUITING—ODD-YEAR BEARING—TO CHANGE THE BEARING YEAR—RE-GRAFTING OLD TREES—HOW TO GRAFT—TIME OF GRAFTING.

AGE OF FRUITING.—The average age at which the Apple will begin to bear profitable crops of fruit, is from eight to ten years from planting in the orchard; varying with the variety, the soil in which it is grown and the care it has received. Upon light, poor soil, and in turf land, fruit will be produced much earlier than in a heavier and richer soil. With proper treatment good crops of fruit may be expected for at least fifty years, although the average bearing age of the orchards of the country is probably much less.

ODD-YEAR BEARING.—In most orchards large crops of fruit are produced only upon alternate years. In northern latitudes the larger crop is borne upon the even year. The cause may be climatic, as severe frosts when the fruit has set or is a little past the blossoming stage. This was illustrated in 1884 in many sections of New England, by a frost the night of June 30th. Upon eastern and southern slopes the petals of the blossoms had fallen, and the fruit was in many cases from one-fourth to one-half of an inch in diameter, and was destroyed; while upon the western and northern slopes, the petals had not fallen and the fruit was uninjured. Those sections where the fruit was destroyed by frost at that time, now promise a large crop; while the trees that fruited in 1884 are fruitless in 1885. Over-bearing one season may result in the exhaustion of the tree, so that it takes one year for it to recover its strength to produce another crop. Drouth for a succession of years may also bring about the same condition, as may also the depredations of the canker worm and other insects. This condition may be corrected:

1. By removing a part or all of the fruit the bearing year soon after setting. One operation is often successful, if thoroughly done, but sometimes it must be repeated. It should be practiced upon young trees until the habit desired has become fixed.

2. By manuring the trees the bearing year with bone and potash, which has a tendency to produce fruit buds; or by using nitrogenous manures the unfruitful year, which will produce a large growth of wood at the expense of the fruit buds.

3. Seeding down to grass the bearing year might produce the same result, but there would be danger that the crop of fruit and the crop of grass taken from the ground the same year, might result in too great a check upon the growth of the tree.

4. Plowing an orchard in turf the unfruitful year would also produce the desired change.

By the judicious use of the above methods the fruit grower may control very largely the bearing year of his fruit trees, and be able to produce fruit when it will bring the highest price.

RE-GRAFTING OLD TREES.—Upon many farms and in many orchards are often found healthy, vigorous trees that produce fruit of little value. Such trees may be grafted with any more desirable variety, and in a few years will produce valuable fruit. The kind of grafting to be employed is called cleft-grafting (Fig. 24). It consists in first cutting off as many branches, from two to three inches in diameter (which are called stocks), as are needed to make a full head, if the whole top is to be grafted. This number will vary from ten to perhaps fifty branches, according to the size of the tree. After all the stocks have been cut off, they are to be pared smooth. Then, beginning with the highest, each stock is split with the blade of the grafting-hook, Fig. 19, *a*. The hook, *c*, is to hang the tool by when not in use. The blade is now driven out by a blow upon the head of the wedge *b*, and the wedge driven into the cleft (Fig. 20), to keep it open until the cion is prepared and inserted. The cion, Fig. 21, a piece of mature wood of last season's growth, from three to four inches long, with from three to five buds upon it, is then cut wedge-shaped in two ways, as is shown in Fig. 21; a cross-section of the wedge-shaped cion is shown at Fig. 22. The cion must be cut with a sharp, thin-bladed knife, with one quick, clean stroke on each side.

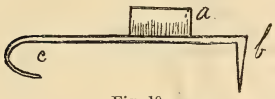


Fig. 19.

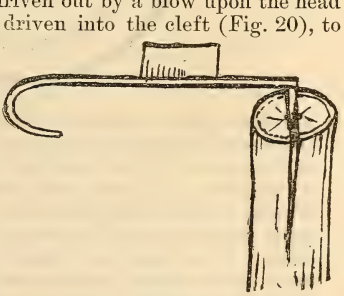


Fig. 20.

The cion is then inserted into the cleft with the cambium or inner bark in close contact with the cambium or inner bark of the

Fig. 21.

stock; the thicker part of the cion at *a*, Fig 22, being placed out-

ward, so that when the wedge in the cleft is withdrawn, the pressure of the stock shall be directly upon the two cambium regions. A horizontal view of the completed cleft-graft is represented in Fig. 23, and a view in perspective in Fig. 24. In the above operation the important points to insure success are:

Fig. 22.

1. A clean, smooth cut upon the cion.
2. The perfect union of the two inner barks or cambium layers.
3. Rapid work, that the cut parts may not be exposed long to the air.

After the grafts have been put in and the wedge driven out, the whole cut surface must be covered with grafting wax, to exclude both air and moisture. A very good article may be purchased of seedsmen and dealers in nurserymen's supplies, or it may be made

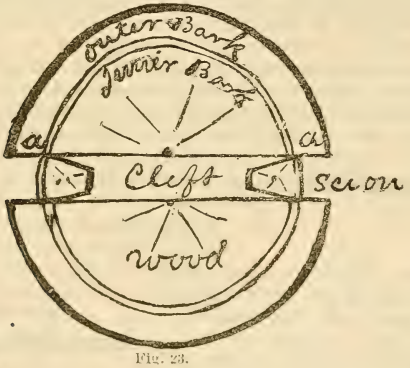


Fig. 23.

as follows: Melt together equal parts of rosin, beeswax and tallow; or one-half the quantity of good linseed oil in place of the tallow may be used. When cool, the mixture should be pulled, to give it toughness. In very cool weather it must be put in slightly warmed water, to make it work easily; and in warm days, it should be taken to the orchard in cold water. Two cions are generally put into each cleft, when large enough, to insure success; but when growth of both has become certain, one should be cut off.

Fig. 24.

In this method of grafting only the branches used for clefts are cut away the first season; for, to cut them all away, would give the tree too severe a check. All suckers that may come out near the cleft during the summer should be removed, that the force of growth may all go into the cion.

The best time for grafting is just as the buds begin to swell, which, for the Apple and pear, is from April 15th to May 15th in the latitude of Boston, or between

the forty-second and forty-third parallels. The plum and cherry must be grafted much earlier to be successful, or from April 1st to April 15th, according to the season. It is often advisable to graft only one-half of the tree the first year, and the balance the next season, to prevent injury from too severe pruning.

CHAPTER VIII.

VARIETIES OF APPLES.

NUMBER OF VARIETIES—SELECTION—NEW VARIETIES—CLASSIFICATION OF VARIETIES—STANDARD SORTS OF SUMMER, FALL AND WINTER APPLES—CRAB APPLES—PROMISING NEW KINDS.

At the present time, there probably are not less than one thousand kinds of Apples in cultivation, each possessing some marked characteristic that will enable it to claim the name of a distinct variety. The variations most commonly found are in form, size, color, quality, time of ripening, habit of growth, color of shoots, and leaves, and their liability to the attack of insects or diseases. Of the numerous varieties that have been described in the more extensive works on fruit culture, probably not more than ten can be said to be thoroughly hardy, productive and satisfactory in any one section of the country. In the West many varieties succeed that are unprofitable in the East, and *vice versa*.

The young fruit grower must decide what kinds are best for him to plant by consulting his markets, as to what kinds are in demand at paying prices; and by consulting his neighbors and successful fruit growers, as to what kinds are best adapted to his soil, exposure, etc.

New Varieties.—Few, if any, of the varieties now in cultivation may be called perfect; and it is the part of wisdom for the grower to try, on a limited scale, a few of the newer and more promising kinds or those adapted to special markets or soils, to determine if some specialty may not be grown that will be more profitable than the common kinds that everybody grows. But until special skill is obtained in growing specialties, or until it is proven beyond a doubt that a new variety has superior merits, or is adapted to a special market, it is best to confine one's main effort to the growth of the safe and sure kinds.

CLASSIFICATION OF VARIETIES.

For convenience of description and the determination of the different kinds, all varieties of Apples are divided in three classes as follows: Summer, Autumn, and Winter, although it may be

difficult often to say where one class ends and the other begins, with many varieties.

STANDARD VARIETIES.—In this list I shall only include a few of those varieties that are especially desirable and profitable in a large section of our country, and especially in New England and the Northern Middle States. For a more extended description of varieties I would refer the reader to that valuable and complete work, "Downing's Fruits and Fruit Trees of America," and the descriptive catalogues of many leading and reliable nurserymen.

SUMMER APPLES.

Early Harvest.—This is a very early yellow Apple, of medium size and fair quality. It reaches its greatest perfection upon a deep, rich and moist soil, and to be profitable the fruit must be freely thinned. It should be carefully picked as soon as fully grown, and taken to the market before it begins to mellow, as in that condition almost every touch will leave a brown mark upon the skin, which injures its sale very much. It is valuable for dessert or for cooking, and is in season in July and August.

Red Astrachan.—A large, flattened, red Apple, of Russian origin. The flesh is very white, crisp and tender, and cooks white; but is rather acid for table use. Tree hardy and productive; August.

Williams' Favorite.—This Apple is, for the table, what the Red Astrachan is for cooking and ripens a little later. It is a large, oblong, conical Apple, of brilliant color, with a mild, sub-acid, aromatic flavor, and veined, yellowish flesh. For the most profit, the fruit must be thinned while small, and at ripening be picked from the tree as it colors; for if picked while green, it fails to color up well. The tree is vigorous, open in growth and productive; August.

Sweet Bough.—A large, pale yellow Apple, sweet, juicy and good; valuable for home consumption. Sweet Apples are not generally in good demand in most markets, except in limited quantities.

FALL APPLES.

Oldenburg (formerly called Duchess of Oldenburg).—Of Russian origin; fruit large, roundish, striped yellow and red; valuable for table or cooking; generally a profitable variety; tree productive and bears early.

Gravenstein.—Another valuable Russian Apple of large size, somewhat flattened; yellow, nearly covered with stripes and splashes of light red. The flesh is crisp, juicy and of the best quality. The tree is remarkable for its vigor and productiveness. It is one of the most desirable and profitable of fall Apples; September to November.

Maiden's Blush.—Perhaps the handsomest Apple in cultivation; of medium size and nearly round; skin of light lemon color, with a shade of crimson often covering one-half the Apple on the ex-

posed side. The flesh is white, crisp, juicy, but rather acid for table use; tree vigorous and productive upon good soil; September and October.

Pumpkin Sweet.—A very large sweet Apple, oblate in form, with more or less russet over the whole surface. In quality rather coarse, but sweet and cooks well. Tree remarkable for its vigor and moderately productive; September and October.

Fall Pippin.—A large Apple somewhat resembling the Rhode Island Greening, but large, with a white flesh and often with some blush upon the exposed side. Tree vigorous and moderately productive; valuable, especially for cooking; September to December.

WINTER APPLES.

Baldwin.—A bright red Apple of medium to large size, of fair quality and a good keeper. Tree vigorous, productive and perhaps more profitable than any other variety for the general market and for shipping. Probably more trees of this variety have been planted in the Northeastern and North Middle States in the past five years than of all other kinds together.

Ben Davis.—A large red or striped, late-keeping Apple; oblong or slightly conical in form, and of fair quality. It originated in the West, and will probably prove valuable in this section.

Fameuse (or Snow Apple).—Fruit of medium size, of deep red color, and with a remarkably white flesh; very juicy, crisp and of the finest quality; tree vigorous and productive. It is a valuable dessert apple, and when grown upon rich soil and the fruit thinned, is of good size and profitable.

King.—A very large, red, striped Apple, of good quality; tree vigorous and productive. Profitable in New York state, but not generally tested in New England.

Lady's Sweet.—One of the best winter sweet Apples; of large size, roundish, conical in form and nearly covered with red; sweet, crisp, tender and keeping till May. Tree moderate in growth, but productive.

Mother.—One of the finest dessert Apples; of large size, oblong, conical, with a very yellow, spicy flesh; tree moderately vigorous and productive; November to January.

Nonsuch.—A large, oblong or conical early winter Apple, of fine sub-acid flavor. Tree moderately vigorous and remarkably productive; a valuable dessert and market fruit.

Rhode Island Greening.—Everywhere known as a very good early winter Apple, succeeding almost everywhere; excellent both for cooking and dessert. Tree rather spreading in form, vigorous and productive.

Roxbury Russet.—A very acid, nearly round, russet Apple, valued especially for its late-keeping qualities. Tree vigorous and moderately productive; requires a deep, rich, moist soil.

Hyslop.—Very large, deep crimson, and of fair quality; very hardy, vigorous and productive.

Transcendent.—A very large variety of the Siberian crab; yellow and red in color and of good quality. The tree is remarkable for its great vigor; moderately productive.

Montreal Beauty.—Very large; bright yellow shaded with red; of fair quality; tree vigorous and productive.

Siberian Red and *Yellow.*—Old varieties, hardly superseded by the new sorts in quality and productiveness.

ADDITIONAL VARIETIES.

SUMMER.	AUTUMN.	WINTER.
Benoni,	Alexander,	Cooper's Market,
Early Strawberry,	Porter,	Fallawater,
Golden Sweet,	Chenango Strawberry.	Grimes' Golden,
Summer Rose.		Lady Apple,
		Tolman's Sweet,
		Danver's Sweet.

NEW AND PROMISING VARIETIES.

Haas,	Red Bietigheimer,	Red Russet,
Sutton Beauty,	Wealthy,	Tufts' Baldwin.

CHAPTER IX.

GATHERING AND STORING APPLES.

GATHERING—SHAKING OFF—PICKING—LADDERS—ASSORTING—PACKING—KEEPING—COLD STORAGE—GENERAL REMARKS.

GATHERING.—Summer and autumn Apples, if for market, should be picked and sent to market as soon as mature, on account of their perishable nature. Yellow and green varieties require greater care in picking and packing than the colored sorts, as every bruise results in a brown mark that injures their sale. For cooking purposes, all the fruit upon a tree may be picked at once; but for table use or to supply fruit stands, some varieties must be picked only as they color upon the tree. Such varieties as the Gravenstein and Fameuse are often very profitable if kept in cold storage until December, when they bring very high prices. As a rule, the sooner Summer or Autumn Apples are in the market the more profitable they are to the grower.

Winter Apples should not be picked until fully grown, but should be secured before severe freezing weather takes place, and always before the ripening or mellowing process begins, to have them keep well. I think it a pretty well settled question that Apples picked early in autumn, *i. e.*, on or before October first, will keep longer than those picked after October twentieth, although they will not be of as good quality nor as large.

No Apples—Summer, Autumn or Winter—should ever be shaken from the tree, as not one in ten thus gathered will fail to receive some injury. The fruit should be picked by hand into baskets suspended by hooks upon the ladder or branches; or in a bag suspended over the shoulder, with the mouth open in front; or by means of the hand pickers shown in Figs. 25 and 26. For getting into the tops of tall trees, the long ladder is indispensable. An improved form is shown in Fig. 27; the sides are drawn together at the end so that the point may be thrust in among the branches without the ends catching, as with the common ladder. An extension ladder, made so as to fold over and form a supporting or step-ladder (Fig. 28), is very convenient for gathering the fruit

Fig. 25.

Fig. 26.

upon the lower branches, and also in the top. The ordinary step-ladders are also very serviceable.

Assorting.—After picking the fruit, it should be put into piles of eight to ten bushels each under the trees, or into barrels and taken to the barn or shed floor, and should be allowed to undergo the sweating or curing process for several days. Some growers pick, assort, and pack the fruit at once in the orchard. If allowed to stand several days in a cool place before heading up, this may not be an objectionable practice; but if the head is put in at once, the fruit will not generally keep as well as if longer exposed to the air after picking.

Fig. 27.

Fig. 28.

The Apples should be sorted into two kinds, the No. 1, or firsts, and No. 2, or seconds. This is absolutely necessary for success. The No. 1 fruit if nicely put up, will often bring more in the market than if both kinds were sold together, for it only requires a very few poor specimens in a barrel to injure the sale of the entire lot. The No. 1 fruit should be large, fair, and free from worm-holes. Some attention should be given to evenness in the size of the fruit in each barrel or lot.

Packing.—For shipping to Europe, or sending to any distant market, there is no package equal to the common, clean flour barrel. The full-sized barrel, holding two and a half bushels, is more satisfactory to all parties than the small "pony" or two-bushel barrel. Before the head is put in, the barrel must be shaken from side to side, to settle the fruit as much as possible. Then pack evenly on top, one or two inches higher than the top of the staves, and the head is then pressed in place by means of a screw-press; or, better, by the simple lever-press, illustrated by Fig. 30, Page 35. The hoops are now driven in place, and the head nailed firmly. Packed in this way, the barrels may be tumbled about to the entire satisfaction of the worst kind of baggage-smasher and not be injured. In packing for shipping to Europe, the bottom layer is *faced*, so that when this head is taken out (and the barrel is opened at this end when offered for sale), the Apples will present an attractive appearance. Honest packing throughout the barrel will be found the most profitable in the long run.

Keeping Fruit.—The best condition for the preservation of fruit is a rather moist atmosphere, with the temperature kept as near to the freezing point as possible. The ordinary winter fruit is commonly kept in fair condition until the middle of March, or sometimes later, at a much higher temperature, in the common cellar.

Perhaps the best way to keep winter fruit, with the ordinary facilities of the farm, is to put it in ordinary barrels with the heads out; or, in large shallow boxes, holding from three to five

bushels, after the sweating process has been gone through with; placing the boxes or barrels in a shed on the north side of another building that can be opened at night and closed during the day; or into a cool, airy cellar that can be opened and closed in the same way. If packed in barrels, only one tier can well be arranged in the room, except by putting rails or narrow boards across the tops of the first tier of barrels, but in boxes they may be arranged as in Fig. 29, in several tiers, so that circulation of air may be obtained over the fruit. In a dry place the barrel has

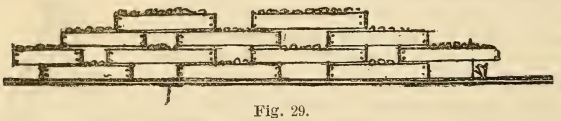


Fig. 29.

the advantage that the fruit is not exposed as much to the air; but in a moist place, unless the temperature is kept very low, the fruit will decay much more rapidly than if in boxes.

By closing the building or cellar during the day time, and opening upon cool nights, the fruit room may be kept much below the average outside temperature. If the fruit begins to decay, it should be attended to at once and be carefully assorted, as a single decaying specimen very soon spreads decay to the others.

Cold Storage.—To preserve any fruit much beyond its natural time of ripening requires special appliances. Cold storage houses are now much used by shippers and fruit dealers. A very simple and serviceable cold storage house may be constructed at a small expense in the following manner: Select a place where the soil is light and dry, and where natural surface drainage will carry the water from the roof readily in all directions; and upon a brick or stone foundation erect a building just like a common ice house, with walls two feet thick. Between the boards upon the walls fill in with spent tan, sawdust or machine shavings, and cover the floor overhead with one or two feet of the same material. Double doors should be provided at each end, and also ventilators at the top, with double covers. The fruit room may be a lean-to against the wall of some other building, thus saving the construction of one wall. The temperature is kept low by opening during cool nights and closing during the day; or, if very low temperature is required, ice must be introduced upon the floor above. In that case, the floor must be made water-tight, and means provided for carrying off the water from the melting ice. During the winter no heat will be required except in very severe weather, when the introduction of a small stove, with a tile chimney passing through one of the ventilators, may be necessary. Thermometers must be kept at all times, both inside and out, for constant consultation.

In all the operations of gathering, packing, sorting, keeping and marketing of fruit, success must depend upon the vigilance and good judgment of the owner. A single hour in severe weather, or a day or two with too high temperature, will often ruin the entire product of a year's labor.

CHAPTER X.

MARKETING THE APPLE.

LOCAL MARKETS—REPUTATION—EXPORTING APPLES—EXTENT OF OUR FOREIGN TRADE—PACKING FOR EXPORT—HOW TO EXPORT APPLES—EVAPORATING FRUIT.

By far the larger quantity of the fruit grown in this country is sold in local markets; and the man who has the largest quantity and the best fruit, can command the best patronage. It requires but a few years to gain a reputation for the production of good or poor fruit, and this reputation generally determines the question of profit or loss in fruit culture. All the fruit possible should be sold in the local markets, as it saves the commission of the middle-man to the producer or consumer, which is a clear gain to the community.

It often happens, however, that the crop in one locality is much larger than can be consumed, and shipping becomes a necessity, in order to keep up the price above the cost of production. Shipping to Europe has become a very extensive business within the past ten years, as is shown by the following summary taken from the NEW ENGLAND HOMESTEAD of June 6, 1885:

The season for exporting Apples from America to England opened August 16, 1884, and closed May 16, 1885, being a period of 39 weeks. Last year the season closed in January, owing to the short crop in this country. The exports for the past five years compare as follows:

SEASON.	NO. BBLS.
1884-5,	787,785
1883-4,	81,552
1882-3,	3,395,594
1881-2,	239,252
1880-1,	1,328,806

TOTAL SHIPMENTS FROM		TOTAL RECEIPTS AT	
Boston,	309,806	Liverpool,	512,213
New York,	256,332	London,	117,947
Portland,	91,483	Glasgow,	141,035
Montreal,	85,479	Hull,	2,224
Halifax,	36,073	Other ports,	14,346
Annapolis,	8,612		

BOSTON SHIPMENTS WERE DISTRIBUTED AS FOLLOWS:

To Liverpool,	256,624	To West Hartlepool,	841
" Glasgow,	19,969	" Christiana,	375
" London,	29,813	" Bergen,	130
" Hull,	1,944	" Gottenburg,	10
		" Antwerp,	100

The average weekly shipments from October 1, to December 30, were 15,280 barrels from Boston and 13,290 barrels from New York; largest weekly shipments, 28,286 barrels and 21,498 barrels respectively. Sixty per cent of the shipments to Liverpool were carried by the Warren line of steamers, the rest being equally divided between the Leyland and Cunard lines. The Allan line carried 83 per cent of the Glasgow shipments, the rest going by the Anchor line. Of the shipments to London 32 per cent went via Liverpool, the Furness line carrying the rest.

Extreme prices were paid for extra Newtown Pippins and other early fall Apples. The English Apple crop was short and the demand active for our fruit. As the magnitude of our 1884 crop became apparent, it was hurried over to Liverpool, causing something of a glut in October. Lower prices were realized in December because of the large supply received too late for the holiday trade. Some of the shipments in February and March were badly frosted and landed in poor condition.

The following statement, compiled from THE HOMESTEAD'S special reports of the Boston, New York and Liverpool Apple markets, shows the average price paid, per barrel for "extra fall" Apples at each market in September and for "No. 1 prime Baldwins" during the ensuing months:

	At Boston.	At New York.	Av. of both.	At Liverpool.	Excess.
September,	$1.46	$1.65	$1.50	$4.50	$3.00
October,	1.46	1.45	1.45	3.32	1.87
November,	1.90	1.93	1.91	5.81	3.90
December,	1.56	1.63	1.54	3.41	1.87
January,	1.82	1.72	1.77	4.01	2.24
February,	2.21	2.81	2.51	3.75	1.24
March,	2,21	2.15	2.18	2.58	.60
April,	2.74	3.62	3.18	4.26	1.08
Average,	1.92	2.12	2.00	3.95	1.95

Most of the Apples exported were bought up by speculators for $1 to $1.25 in the country, and cost 15 to 35c. per barrel to get on shipboard. Freights from Boston to Liverpool have been two to three shillings per barrel, averaging about two shillings six pence, or 60c. The brokers who handle the sale of the goods charge 5 per cent commission on the gross amount of the sales, or 20c. per barrel on a shipment that sells for an average of $4 per barrel. Probably $1.60 per barrel will represent the average cost to speculators of Apples on shipboard during the past season. Add 60c. for freight and 20c. for commission, and the middleman has $2.40 to deduct from the price received in Liverpool. It appears from our comparative statement above that the average price has been $3.95 per barrel in Liverpool, which leaves a profit to the middleman of $1.55 per barrel—more than the producer received. To be on the safe side, suppose we call this margin only $1 per barrel and allow 887,785 for shipments that resulted in loss, for shrinkage, etc., then on the total exports of 787,785 barrels it will be seen that the middlemen have made an even $700,000.

Now if farmers had followed the simple directions for placing Apples on the Liverpool market, which THE HOMESTEAD gave in August last, they could have saved the larger portion of this amount. We

know several who did follow our directions and realized from 50c. to $1.25 per barrel more for their crop than the local buyer offered.

I also append a description of the best method of preparing the fruit for shipping, taken from Herbert Myrick's valuable work, "Money Crops; How to Grow and How to Sell Them," published by the Phelps Publishing Company, Springfield, Mass; price 50 cents:

What we wish to emphasize here is the proper preparation for market and the marketing of this great money crop. Careful sorting into various grades of quality and honest packing are essential to the lasting success of any brand—for we assume that every large orchardist or apple packer puts his special brand on every barrel he fills and strives in every way to get up a reputation for that brand. In the Liverpool, England, auction market, which annually consumes from one to three million barrels of American fruit, certain brands have become so well known for honest packing and uniform good quality as to command one to three shillings per barrel above other stock. As Liverpool prices are usually high enough to make a handsome return above the New York market, and as the foreign demand is constantly increasing, the American farmer will not fail to give more attention to this profitable crop. Red Baldwins are most popular in England, those from Nova Scotia standing first, Canada second and America third, this classification being due to method of packing largely. The plan pursued by the most successful Nova Scotia fruit growers is this:

Take the hardwood barrel under the tree for convenience, pick the Apples with care, place them in without sorting, and when filled head the barrel without pressure. Then wheel it into the fruit house, and let it remain there during the sweating or curing process. When ready to make a shipment the process of sorting begins. Have a large table in the fruit house, and on it empty the barrels, two at a time. Apples can be selected much better in this way than if picked from a heap on the floor. Aim to select none but perfect Apples, but as those of every variety have different degrees of perfection in size, form or color, make two classes and mark them accordingly. In packing or filling the barrel, the object is to get into the package the largest quantity with the least injury to the fruit. Apples are very easily injured by too much pressure applied to them in packing, and also by being packed too loosely. When the barrel is properly filled, instead of putting on the proper head in the first place and applying pressure to it, use a false cushion head which will play loosely in the barrel. This cushion head is lined, a piece of old sacking answering well for the lining. Considerable pressure can be applied to this cushion head without injury to the fruit. Place this cushion upon the Apples, and apply the press (Fig. 30) with a pressure sufficient to get the Apples together throughout the barrel. Then remove the false head and place the head proper, apply the press and complete the work. In marking, use the words "choice" or "medium," as the case may be, stenciled in small letters on the barrel, accompanying the name of the Apple. Then on each package stencil the name of the packer in full, as a guaranty of the uniformity of the package throughout.

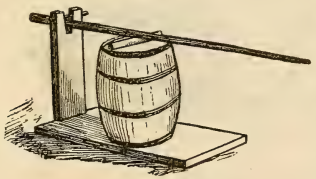


Fig. 30.

Full and complete instruction as to exporting Apples, so as to save to the farmer the enormous profits sometimes made by the fruit buyers and exporters, are also given in the work above quoted.

CHAPTER XI.

INSECTS INJURIOUS TO THE APPLE.

THE ROUND-HEADED BORER — FLAT-HEADED BORER — WOOLLY LOUSE — OYSTER-SHELL BARK LOUSE — TENT CATERPILLAR — CANKER WORM — APHIS — CODLIN MOTH — MAGGOT — CURCULIO.

THE ROUND-HEADED APPLE-BORER (*Saperda bivittata*) (Harris). —This is one of the most injurious insects to the Apple tree. The perfect insect, Fig. 31, *a*, is a beetle about three-fourths of an inch long, with three light-brown and two creamy-white stripes upon its wing covers. It flies in the night, laying its eggs upon the trunk in crevices of the bark, near the ground, in June and July. The eggs hatch, and the young larvæ penetrate the bark, feeding upon the sapwood for nearly two years; often eating a space from one to two inches in diameter, and in young trees sometimes nearly girdling them. Its chips are packed behind it, except a few during its early stages of working, when, by careful examination of the tree, its presence may be discovered. After the second year it generally penetrates the heart-wood, sometimes going through young trees; or, in larger ones, making a turn and coming near the bark, where it undergoes its changes (Fig. 31, *b*, shows the chrysalis) and comes out the perfect beetle (Fig. 31, *c*,) the third year, leaving a clean hole about three-sixteenths of an inch in diameter.

Fig. 31, *a*.

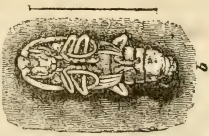


Fig. 31, *b*.

Fig. 31, *c*.

It may be discovered in the tree by the fine chips it exudes while very young, and by the bark over the injured part turning dark-brown, and sometimes cracking.

Remedy.—The only sure remedy is to examine the trees carefully once or twice each season, and dig out the borer with a strong, pointed knife.

THE FLAT-HEADED APPLE-BORER (*Chrysobothris femorata*).—This beetle is much smaller than the last, and moves in the day

time. It lays its eggs, not only upon the trunk, but sometimes on the main branches.

The flat-headed larvæ, Fig. 32, *a*, works, for a time, in the sap-wood, then makes an upward burrow, and, turning, comes out in another place, just under the bark, where it undergoes its changes. Fig. 32, *b*, shows it in the chrysalis state; Fig. 32, *d*, is the perfect beetle; Fig. 32, *c*, the head of the borer, enlarged. It is uncertain whether the Flat-headed Apple-borer completes its growth and transformation in one or two years.

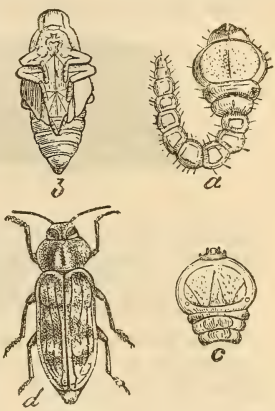


Fig. 32, *a*, *b*, *c*. *d*.

Remedy. — Its presence may be known in the tree in the same way as the Round-headed Apple Tree Borer, and the same remedy must be applied.

The use of washes upon the trunk to prevent insects from depositing their eggs is of uncertain value. Perhaps the best of these is a solution of soft soap in which has been mixed a teaspoonful of crude petroleum to the gallon or a tablespoonful of carbolic acid or coal tar.

The Woolly Louse, or Aphis (*Schizoneura lanigera*).—Although commonly known as the root louse, and more generally found upon the roots of the Apple, it often causes much injury to the branches. It is a small insect (Fig. 33), about one-sixteenth

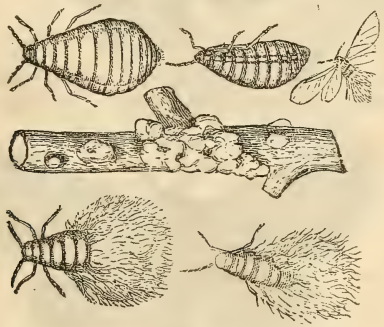


Fig. 33.

to one-eighth of an inch long, and more or less covered with a cottony or nearly white substance, whence comes its common name. It attacks the branches in patches, sucking their juices, and causing black, canker-like places, which spread, often destroying the limbs.

Remedy.—The application, with a stiff brush, of the solution of soft soap, recommended above, will probably effectually destroy them.

The Oyster-shell Bark-louse (*Aspidiotus conchiformis*).—This insect, shown in large numbers in Fig. 34, is injurious, by

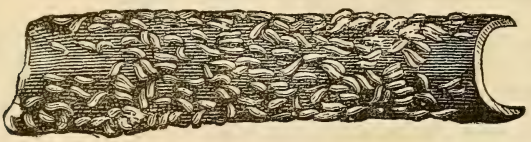


Fig. 34.

sucking the juices of the branches of both young and old trees. It is most common among trees weak in growth.

Remedy.—It may be destroyed by brushing the branches over *lightly* with pure linseed oil, or with the solution of soap.

The Tent Caterpillar (*Clisiocampa Americana*).—This insect, so familiar to every one in its larva state, is illustrated, in all its forms by Figs. 35 to 37. Fig. 35 shows the male fly, Fig. 36 the

Fig. 35.

female, and Fig. 37 the development—*c*, the eggs, *a*, *b*, the caterpillars and their nest, *d*, the cocoon. Its eggs, Fig. 35, *c*, are

Fig. 36.

laid late in the summer around the small twig at the ends of the branches, generally from two to three hundred in a cluster.

Here they remain until the leaves start in the spring, when the worms hatch out and feed upon the leaves, and cluster in the forks of the branches, as shown in the figure.

Remedy.—The larvæ may be found at home in their nests early in the morning, during wet weather, and in the middle of hot,

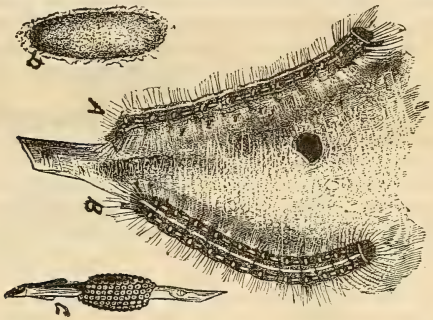


Fig. 37.

sunny days; when they may be readily removed by drawing the web around them and crushing it with the foot. In the winter, the clusters of eggs may be found by passing under the tree and looking up against the sky; when they may be removed by cutting off the twigs with the pruning hook.

THE CANKER-WORM (*Anisoptery vernata*).—Fig. 38—*a* male, *b* female. This, in certain sections, is undoubtedly the greatest

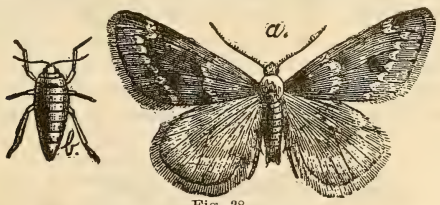


Fig. 38.

pest the Apple grower has to contend with; yet, knowing its habits, if prompt application of well-known remedies are made, it may be easily and cheaply prevented from doing harm.

The female, which has no wings, comes out of the ground during warm weather, when there is no frost in the ground, from December to May, in our latitude, and lays its eggs in clusters upon the bark of the trunk and branches. As soon as the leaves begin to unfold, the eggs hatch and the larvæ feeds upon the foliage, eating all but the midrifs, until the trees appear as if fire had run through them. The injury thus caused is such that often after a few years the trees gradually die.

Remedy.—Taking advantage of the habits of the female, which

must crawl up the tree to deposit its eggs, tar or printers' ink is applied to the trees after December 1, and *kept fresh by renewal* during warm days, when the females can run; thus the ascending insects are caught and destroyed. This is an effectual remedy, but requires constant attention from December to May, whenever the weather is warm and there is no frost in the ground.

Another effectual remedy is to encircle the tree with a metallic trough in which is placed cheap oil, like crude petroleum. The first cost of this remedy is more than the expense of tar, but it does not require as constant attention.

Within the past two or three years the attempt to prevent the ascent of the female has been abandoned, in many sections, and the larvæ are destroyed as soon as they are hatched out, by the use of paris green. This is applied in water, at the rate of one hundred gallons to one pound of paris green, with the common hand or garden pump. This remedy is effectual, and is cheaply applied by placing barrels of the mixture upon a low wagon and driving among the trees. If the trees are thoroughly sprayed and no rain follows for several days, one application is generally effectual, but sometimes a second or third syringing is required. The principal objection to this remedy is in the danger, to both man and animals, in the use of so dangerous a poison.

A safe and equally as effectual a remedy is found in the Pyrethrum or Persian insect powder. If used in the same way as the paris green, it will destroy the larvæ while young, and will paralyze the larger ones so that they will fall at once to the ground. As the more mature larvæ will attempt to crawl back to the tree, a single application only of the band of ink is necessary to catch and destroy them. This powder is *perfectly harmless* to man or animals, is as effectual as the paris green, and should be used in preference to that deadly arsenical preparation.

The Apple Aphis or Plant-louse (*Aphis mali*).—This is a small, green fly (Fig. 39) (very similar to the common plant-

Fig. 39.

louse which attacks house plants), that often appears in large numbers upon the young shoots, injuring them by sucking out their juices. It is destroyed by the application of a strong solution of whale-oil soap and tobacco water, or by the application of the pyrethrum powder just at night.

THE CODLIN MOTH (*Carpocapsa pomonella*).—Fig. 40 is an Apple injured by the codlin moth; *e*, larvæ escaping; *f*, moth at

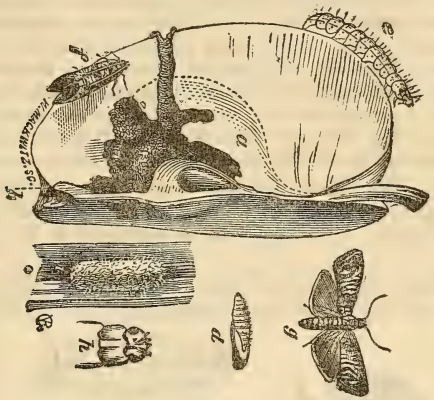


Fig. 40.

rest; *g*, same with its wings spread; *d*, chrysalis. This is perhaps the most injurious insect that attacks the fruit of the Apple. It flies at night, and lays its eggs in the calyx or blossom-end of the fruit after it reaches a half inch in diameter. The egg hatches, and the fruit is destroyed, as shown in the figure. At maturity, the worm comes from the Apple and forms its cocoon under the bark of the tree, upon boards, fences and other dry places.

Remedy.—Pasturing the orchard with swine or cattle will destroy many of the worms that fall with the fruit, while a large number of fowls in the orchard will generally attend to all that may come out of the Apples before they fall. The cocoons may

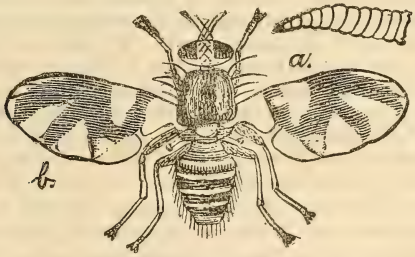


Fig. 41.

also be trapped under bands of straw or cloth put around the trunks of the trees, and examined occasionally during the summer.

A second brood often comes out in the early autumn, which attacks the winter fruit.

The Apple Maggot (*Tripeta pomonella*).—This insect has so increased within the past few years as to threaten the total destruction of the Apple crop in some sections. The perfect insect is a small fly, (Fig. 41, *b*), resembling, the common house fly, but is much smaller. As the Apple approaches maturity, the fly lays its eggs in the fruit by puncturing the skin. The larva, or maggot, (Fig. 41, *a*), of which there are often several in one apple. make burrows in all directions, rendering the fruit worthless.

Remedy.—No remedy but the destruction of the infected crop by feeding to swine or cattle has been discovered as yet. This will be effectual if all the fruit is destroyed as it falls from the tree.

The Plum Weevil, or Curculio (*Conotrachelus nenuphar*).—Fig. 42—*a*, the perfect insect, much enlarged; *b*, natural size, at

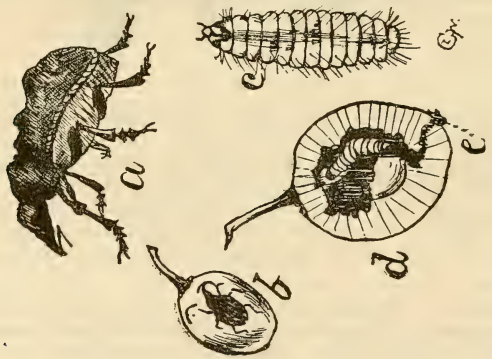


Fig. 42.

work upon the plum; *c*, larvæ; *d*, injured fruit. Until recently, it was generally supposed that all the worms found in the Apple were the larvæ of the codlin moth. My attention was attracted two years ago to the large number of Apples falling from the trees early in the summer. Upon examination it was found that nearly every one bore the crescent-shaped mark of this insect, and most of them contained the worms of the plum weevil. In the examination of nearly one thousand fallen Apples, only eight or ten contained worms that did not bear the marks of this insect.

Remedy.—The only effectual remedy for this injury to the Apple is the same as for the codlin moth and Apple maggot.

Labels for Fruit Trees.—Apple trees and all fruits should be carefully labelled, that the owner may not forget the names of the kinds, and also that any subsequent possessor may know without doubt what varieties he is growing. Most of the confusion in

names of fruits and plants results from forgetfulness and guess work.

The best label that can be used is the triangular zinc, six to eight inches long, one inch wide at one end and tapering to a point at the other, and written upon with a common lead pencil. A name written upon such a piece of zinc, slightly corroded (old zinc is better than new) will last a lifetime and increase in distinctness from year to year.

The label is attached to the tree by winding the small end around a small branch. As the branch increases in size the zinc uncoils so as not to cut into it, and when the branch becomes too large to retain it, the label is attached to a smaller one. Any label, however, is liable to become displaced by wind, teams, etc.; and if perfect security is desired, a plan of the orchard or garden must be made and the names of the varieties recorded in their proper places. As long as the plan is preserved there can be no uncertainty as to the location and names of varieties.

CHAPTER XII.

THE PEAR (PYRUS COMMUNIS).

ITS HEALTHFULNESS—ORIGIN—VALUE—IMPROVEMENT—PROPAGATION—THE NURSERY—THE ORCHARD—FORMING THE HEAD—VARIETIES—HARVESTING—MARKETING—PRESERVING—INSECT PESTS—DISEASES.

Although not generally considered one of the most healthful of fruits, the Pear is, from its peculiar flavor and qualities known as melting, buttery, sugary, etc., a fruit much liked by most people; eaten in its fully ripe condition and in moderate quantities it is a healthful and delicious fruit.

In its natural and unimproved condition, the fruit was hard and composed almost entirely of gritty wood cells, known to botanists as sclerogenous cells, and a harsh and astringent juice that was anything but digestible, and which led that ancient writer, Pliny, to say, "All varieties whatsoever are poor meat unless baked or boiled." Until fully ripe, most varieties of Pears have more or less of the above qualities, and should be eaten with moderation, unless cooked. For preserves no fruit is superior to the Pear.

Like the apple, the Pear is a native of Middle and Northern Europe. It is a tree that sometimes in its most natural condition lives to a greater age than the apple, but is much more liable to the attack of disease. The Pear stands third in the list of large fruits, in the value of its products. The methods of improvement are the same with the Pear as with the apple. Perhaps about an equal number of good varieties of Pears may be credited to improvement by hybridization and selection; while, like the apple also, many of the best varieties of Pears are chance seedlings, the origin of which no one can tell.

PROPAGATION.—It is propagated by root-grafts and by budding. The seedlings used for stocks are generally imported from France, where they are grown in large quantities and to great perfection. Some nurserymen are successful in growing their own seedlings from imported seed. The best seed is that obtained from vigorous, natural seedlings. The seed-bed should be in a rich, warm, new soil, rather moist than otherwise. The seedlings are gener-

ally liable to the attack of the leaf blight that stops their growth in July. For this reason, the bed must be made unusually rich with an abundance of well-rotted stable manure, and a liberal supply of bone and potash. The seedlings should have the same treatment as the apple in grafting and when planted for budding. The best results are generally obtained from budding, although some nurserymen are very successful with root-grafting. For the best results, the grafts should be made early in winter, and greater care is required in keeping them until spring.

Nursery.—The soil for the growth of the tree in the nursery should be deep, rich, and rather moist, but well underdrained, naturally or otherwise, and kept thoroughly cultivated. The seedlings and root-grafts are planted in the same way as the apple and the same distance apart. At from two to four years from budding the trees are ready for transplanting to the orchard.

The Orchard.—For the best results, land like that described for the nursery should be selected. The Pear will not prove profitable upon such a great variety of soils as the apple, but good fruit may be obtained in limited quantities even in poor soil, if an abundance of plant-food is supplied, and mulch provided to prevent the escape of moisture.

The preparation of the land, the tree, and the methods of planting are the same as for the apple, to which the reader is referred.

The Pear tree naturally grows in a pyramidal form, and, while it sometimes grows as large in diameter as the apple tree, it is more compact and requires less distance. Fifteen by twenty feet are the best distances, according to the variety and method of training. Such varieties as the Seckel, Giffard, Bartlett, etc., and other varieties if unpruned at the ends, and most other kinds, if kept well headed-in, need not have more than the former space, while Clapp's, Boussock, etc., should not be planted less than the latter distance.

Forming the Head.—During the first few years of its growth after planting in the orchard, the Pear tree has a tendency to growth in only two or three leading shoots. All but one of these must be pinched in at once, and the centre one or leader must be pinched a little later and be forced to throw out laterals. In the formation of the head, the branches should be distributed along the leader, as shown in Fig. 13, Page 15. Close attention must be given to prevent, by pinching, any branches out-growing the leader, or from growing more upon one side than the other.

In land that must be cultivated, the head should be formed at least five feet high, to enable teams to work readily under the branches.

The Age of Bearing.—The Pear tree may be expected to produce paying crops of fruit from five to eight years from planting in the orchard, according to the variety. Unless attacked by disease it will bear for fifty years and upward. Like

the apple it generally produces fruit only on alternate years, unless the land is kept quite rich. The cause of this habit is the same as with the apple, and the remedies the same.

VARIETIES.—In form, size, and color of fruit, the Pear does not vary as much as the fruit of the apple, but in the color of the branches and the leaves and its habit of growth, the variations are much greater; so much so, that most varieties may be distinguished by the expert upon examination of the tree alone. Varieties may be classed as Summer, Autumn and Winter.

SUMMER PEARS.—These, as a rule, are small in size and very perishable. Among the best, in order of ripening, are:

Osband's.—Small, nearly round; skin green, changing to yellow when ripe, with a brownish cheek; valuable only for home consumption.

Giffard.—Medium size; in form and color like the Bartlett, but with more blush upon the exposed side; tree of rather slender growth and moderately productive; of good quality and one of the most profitable early Pears.

Rostiezer.—Of fine quality; small in size, acute pyriform; in color resembling the Seckel; one of the best in quality, but the tree is of very straggling, irregular growth.

Clapp's.—A very large Pear of fair quality, but has the fault of rotting at the core if ripened upon the tree; obtuse pyriform; yellow, with a brownish red blush upon one half. The tree is vigorous and productive, coming early into bearing. The fruit must be picked at least two weeks before it would naturally ripen upon the tree.

AUTUMN PEARS.

Bartlett.—This, among the Pears, is what the Baldwin is among the apples, and the Concord among the grapes. The fruit is large, of fair quality and never rots at the core. The tree is moderately vigorous, and so productive that it is liable to injury by overbearing; a fault that must be remedied by thinning, and by giving an abundance of plant food the bearing year. It is in season in September.

Bosc.—A large, light russet Pear, with a large body and long neck, to which is attached a long stem; flesh white, juicy, and of fine quality. The fruit is so large and heavy that it is liable to drop, and the tree should be trained low. It is one of the best fall Pears, ripening in October in our latitude.

Seckel.—Small, of the best quality; obtuse pyriform; light cinnamon russet, with a brownish red blush on the exposed surface. To be of good size the fruit must be thinned. The tree is a vigorous and compact grower, and regularly productive, ripening in October.

Sheldon.—Nearly round, russet, of large size, juicy, sweet and good. The tree is moderately vigorous and productive; one of

the best in cultivation. The color of the fruit is rather against it for market, but when it becomes known it brings good prices. It is in season from October to November.

Anjou.—Large, obtuse pyriform; greenish yellow when ripe, with a slight blush upon the sunny side; flesh white, juicy, melting and rich; tree vigorous, hardy and moderately productive. The fruit is the finest of its season—from November to December.

WINTER PEARS.

Lawrence.—Medium to large; resembling the Bartlett in form, but rather shorter and of a light yellow color; flesh juicy, sweet and good; tree moderately vigorous and productive. It is one of the best early winter Pears, coming in season in December.

Dana's Hovey.—A small Pear, resembling the Seckel somewhat in color and quality; round or obovate in form. It is perhaps the best winter Pear in quality, but its size makes it objectionable for market.

ADDITIONAL VARIETIES OF VALUE.

SUMMER.	AUTUMN.	WINTER.
Bloodgood,	Howell,	Josephine of Malines,
Dearborn,	Flemish,	Easter,
Tyson,	Boussock,	Comice,
Souvenir du Congres.	Clairgeau.	Vicar.

NEW VARIETIES OF PROMISE.

Frederick Clapp, President Clark.

GATHERING AND RIPENING.—All varieties of Pears, with one or two exceptions, are improved by picking from the tree, from one to two weeks before they would naturally soften. Varieties like Clapp's and some others that rot at the core, must be picked as early as two weeks, while the Bartlett may be allowed to grow longer. The longer a variety can remain upon the tree the larger they become, as all fruits increase very rapidly in size just before the mellowing process begins.

The best way to ripen the Pear to have it the most highly colored and of the best quality, is to place them in shallow trays or boxes in a dark, cool room.

MARKETING.—The early varieties of this fruit are very perishable and should be marketed as soon as ripe. Clapp's, Bartletts and Boscs brought into market a little before their season, by picking early and hastening the ripening process in a warm, close room, often command a much better price than if sold when the main crop naturally comes in. So such varieties as the last two autumn kinds and Sheldon, Anjou, etc., if kept a month or two in cold storage, sometimes sell at double the price received at the natural time of ripening. The grower who is alive to the times will soon learn whether he can get a larger income by selling

early or late, and must be prepared to do either as his best judgment shall dictate.

Preserving.—Summer and Autumn varieties cannot be preserved much beyond their natural season without considerable expense, but late fall and winter kinds may be kept in the same manner as the apple. For shipping to a distant market, the barrel is the best package, unless the fruit is soft, when they must be sent in crates or baskets. For storing and keeping the fruit, shallow boxes are much better than the barrel. Until the ripening process begins, the fruit should be kept in a cool, airy place, as they are less liable to decay than if in a close atmosphere.

Insect Pests.—All the insects described as injurious to the apple, with the exception of the canker-worm, are more or less injurious to the Pear, and the same remedies should be applied.

In addition to the above, are the Pear-tree Psylla (*Psylla pyri*). This is a very minute insect that punctures the branches and leaves in May, causing an exudation of juice which attracts numerous ants, flies and wasps which feed upon the juices that escape. The exudation dries and becomes sticky, and the particles of dust in the atmosphere adhere to the shoots and leaves, so that during the latter part of summer the whole tree has a blackened, dirty appearance. A diluted emulsion of kerosene and soft soap is an effectual remedy. This is described by Prof. Riley, as follows: Take two parts of kerosene and one of soft soap, and churn or stir until a kind of butter is produced. This preparation may be diluted with ten, twenty or fifty parts of water, according to the delicacy of the plant or the insect to be destroyed.

A few other insects are slightly injurious to the Pear, but a description is not deemed important in so condensed a work as this.

For a detailed description of *all* insects injurious to fruits and fruit trees, the reader is referred to Saunders' "Insects Injurious to Fruits."

Diseases.—*Fire Blight.*—This disease is often very destructive to the Pear, and its effect is to cause the leaves, shoots, and sometimes the entire tree—but more often only a portion of it—to turn dark brown or black, as if scorched by fire. It always follows some cause of weakness, as a late growth in the fall, caused by the use of coarse manure or late cultivation, when the shoots are injured by cold; or after bearing a heavy crop of fruit; or it may result from an exhaustion of the soil, or from the unnatural growth caused by plowing after the land has been in turf for some time; or from seeding down with a grain crop. In almost every case that has come under my observation, some reasonable explanation may be given for its appearance. The disease is of a fungoid or algoid nature, and *only attacks trees that have become weakened in some way.*

The only remedy is, first, to cut away the diseased parts as soon

as the disease appears; and by the use of the proper kind of food and cultivation, obtain a healthy growth. If the soil is rich, do not cultivate and apply potash; if poor, use potash, fine ground bone and some nitrogenous material in the fall or early spring.

Leaf Blight.—This is a disease that attacks the leaves of young seedlings and sometimes of established trees. It is a fungus growth, similar to the grape, strawberry and other leaf diseases, and is remedied only by good cultivation and proper food. It often comes upon the Pear seedlings planted in the nursery in July, when, *upon the first indication* of its presence, budding must begin, or the leaves will soon fall off and budding cannot be done at all until the following season.

CHAPTER XIII.

THE PEACH (*PRUNUS PERSICA*).

IMPORTANCE — ORIGIN — PROPAGATION — ORCHARD — FERTILIZATION—AGE OF BEARING—WINTER PROTECTION—THINNING THE FRUIT—VARIETIES—GATHERING—MARKETING—INSECTS—DISEASES—ROT.

In importance, as a money crop, the Peach stands second in the list of large fruits. It is a healthful and nutritive fruit, when perfectly ripe, and liked by all. To reach its best condition, the Peach must be ripened upon the tree, but when shipped a long distance, it cannot be allowed to ripen before picking.

ORIGIN.—The Peach is supposed to have originated in Asia, from the bitter almond. It has long been cultivated in Southern Asia, China, and Southern Europe, and is much esteemed as an article of food and luxury. Its successful cultivation has always been confined largely to the Southern temperate zone, as the tree is naturally tender and liable to injury from sudden climatic changes. In favorable locations and under the proper treatment it is, however, often a profitable crop even north of the 42d parallel.

PROPAGATION.—It is propagated by budding upon seedlings that are grown in the nursery, instead of the seed-bed, as with the apple and pear. The seeds that produce the best stocks are those from strong, healthy, natural, new-budded seedlings. Most of the seed used by nurserymen is obtained from Virginia and Tennessee, where natural fruit is largely grown, and where it is claimed the disease known as the "yellows" has not made its appearance.

The pits may be planted either in the fall or in the spring. In fall planting they should be covered about two inches deep, if the soil is heavy, or three inches if light, in rows four feet apart and three or four inches in the row. In spring planting, the pits are "bedded" the fall previous; that is, placed in a bed about six or eight inches deep in layers first two inches thick of seeds, then two inches of soil, and so on until all the pits are put in; making the bed from six to ten inches thick. The action of the frost cracks the stones so that the kernels will most of them shell out

when they begin to germinate in the spring. It sometimes happens that the action of the frost is not sufficient to crack the stones, when it must be done by a slight blow with a light hammer upon the edge of the pit, placed upon a block of wood. The kernels should be planted in rows the same distance as for fall planting, and be covered one inch deep. The advantage of fall planting is that it requires less labor, but many of the pits will fail to germinate, and where small quantities are grown this method is not to be recommended. In spring planting, every kernel will generally germinate and the nursery rows will be more fully stocked than if the uncracked pits were planted in the fall.

The soil best adapted to the growth of good trees is a medium sandy or gravelly loam. The fertilizer used should be well decomposed stable manure, in moderate quantities, with fine ground bone and potash. The land should not be too rich, as, if the growth is very rapid and coarse, the trees are liable to injury during the winter. A soil that will produce fifty to seventy-five bushels of corn to the acre is sufficiently rich for Peaches.

Budding.—The seedlings make a rapid growth and will be in readiness to bud in August. The best time for this work is *just before the growth is checked by early frosts*, or the last of August or first of September. The Peach is very easily budded and the growth is so rapid at this season that the bands must be cut in a week or two from the time of budding or the buds will be injured by the cutting in of the bands, or rather by the over-growth of the stock. The stocks should be cut off the following spring and only the inserted bud allowed to grow, as directed for the apple. At one year from cutting of the stock, the trees are in their best condition for transplanting, and at this age are better than if older. They are divided into No. 1 and No. 2 grades, classed according to size. The larger trees are generally those that were budded upon the stronger and most vigorous stocks, and consequently are most valuable; although the smaller the tree, as a rule, the less loss of roots there will be in digging and in two or three years from planting the smaller trees will often equal the larger in size. June-budded trees are being advertised very largely by many nurserymen. Although small in size, having grown only one season from the seed, the roots are much less injured in digging and are less checked by removal than larger trees. In cost there is little or no advantage either way between the June-budded and the No. 1 fall-budded trees.

The Orchard.—The best soil for the Peach is a warm, sandy or gravelly loam, situated upon more or less of an elevation. The exposure may be either north, south, east or west, if the land is high; but the fruit will be of better quality if the exposure is to the south, southeast or southwest. The reason why the Peach succeeds better upon high land may be found in the fact that the extremes of heat and cold are not as severe, and that the higher up we go the earlier and more thoroughly will the wood be ripened, and the later will the buds start in the spring.

There is, perhaps, less variation in size and form of tree in the different kinds of Peaches than with other fruit trees, and the distance of planting is more uniform. For unpruned trees (those not headed-in), the distance should be eighteen by eighteen, or twenty by twenty feet. If the tree is to be kept headed-in, which is advisable, ten by fifteen, or twelve and one-half by twelve and one-half feet will be sufficient.

PLANTING.—The tree should be prepared for planting in the same way as the apple, except that it may be advisable to cut off all the laterals to allow a new head to form upon a clean stem three or four feet high. In pruning up in this way to a "stick," care must be taken not to cut off the buds at the base of each shoot, as the proper formation of the head depends upon having buds well distributed along the main cane. Having the branches distributed along the axis, as is illustrated in Fig. 14, Page 15, is more important in the case of the Peach than with any other fruit tree, as the wood is very brittle and easily broken by the weight of fruit.

Transplanting, training and pruning are the same as described for the apple. An annual pruning, however, should be given, consisting of cutting back the last season's growth one-half in the fall or winter to keep the tree in close, compact form, as is shown

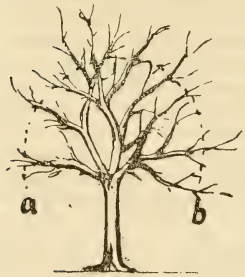


Fig 43.

Fig. 44.

by the dotted line *a*, *b*, Fig. 43. This is rendered necessary by the natural tendency of the tree to grow only at the ends, producing few or no new laterals each year and resulting in the condition illustrated by Fig. 44, unless corrected.

CULTIVATION AND MANURING.—This subject, as discussed under head of The Apple, may be applied to the Peach. In the application of manure or fertilizer to any fruit crop, and to those especially like the Peach and pear, that are liable to injury from cold and other causes, great caution must be used. No tree can be expected to produce a large crop of fruit without a liberal supply of food. The farmer never expects to get a large or paying crop of corn or potatoes from land unless he applies from

fifteen to fifty dollars' worth of manure or fertilizer; yet many a fruit grower will expect to gather crops, many times the value of either of the above, without any fertilizer at all. The fruit growers who apply to their orchard annually twenty-five dollars' worth of fertilizing material, I believe are few in number. In the case of a Peach orchard from five to ten years old, this amount, or even fifty dollars' worth would not be too large a supply to put on to an acre when the trees are to bear a heavy crop. As with the apple and pear, manures or fertilizers should be applied late in the fall and early in the spring. While young, much care is needed not to force too large a growth of wood. For fruit, ground bone and potash is the best fertilizer that can be used.

The growth of the Peach tree in turf land promises to be a method by which much of the climatic injury may be avoided.

AGE OF BEARING.—Fruit may be expected in paying quantities at from three to five years from planting in the orchard. The average age of the Peach tree in this section is hard to determine, but is not probably over ten years from the time of transplanting, and during this time the average number of crops may perhaps be three.

The greatest obstacle to the successful cultivation of the Peach in this latitude, is the destruction of the fruit-buds in cold weather. It occurs in seasons when the growth is late, or when the buds are started into growth by extremely warm weather in December, followed by severe cold. It is claimed by many fruit culturists that the fruit-buds will be destroyed under any conditions when the thermometer indicates 15° below zero. Little, however, is positively known as to this matter, and this claim may be generally the case, but I have known buds to be uninjured by a temperature of 18° below zero, and also to be destroyed by a temperature not lower than 18° above zero, Fahrenheit.

WINTER PROTECTION.—This uncertainty of the Peach crop leads us to consider if some means may not be employed by which the crop may be made secure.

One method which I successfully adopted a few years since, is that of laying down the trees. Two young trees about four years old were taken for the experiment. The roots upon one side were loosened and cut off at about one foot from the tree. The soil was then loosened upon the other side, and the trees bent down and held in place by a heavy post. Over the whole was thrown a few bundles of corn stover. The roots that stood out of the ground when the tree lay prostrate were covered with a foot or two of soil. In this state the trees passed the winter in safety, and in the spring were righted up and the soil pressed carefully and firmly about the roots. The result was a fair crop of Peaches when all other buds were destroyed. This seems a practicable method, and if the roots are made to grow more largely upon one

side of the tree than the other by an occasional root-pruning, there can be little difficulty in bending over even large trees, and little injury need result to the tree.

Standing up or tying pine boughs or corn stover in among the branches has been also suggested, and might be easily and cheaply accomplished if the trees are trained low. The high price which thoroughly ripe native fruit commands, will warrant considerable expense in the application of any system that will insure a crop every season.

THINNING THE FRUIT.—Of all the large fruits cultivated perhaps none are more benefited by thinning than the Peach. The tree is very likely, when it does produce a crop, to set so many blossoms that the tree will be almost certain to be injured in its attempt to ripen the crop. The annual pruning or shortening-in is beneficial by removing nearly one-half of the fruit buds, but it will be found that one-half of those remaining may generally be removed. When the fruit has reached from one-fourth to one-half inch in diameter, the trees should be examined and all imperfect specimens removed. Only one good specimen should be left on the short spurs of from one to five inches in length; and on the longer branches, only one to each five inches of wood. The quantity of fruit will not be diminished, on account of the increased size of each specimen, while the number of seeds matured will be lessened. Now the injury to the tree results from its effort in ripening a large number of seeds, rather than in the pulp that surrounds them, hence the wisdom of thinning the fruit on this account alone.

CLASSIFICATION.—The fruit is divided into two great classes, the "white fleshed" and "yellow fleshed" varieties. These may be again divided into "freestones" and "clingstones,"—those in which the stone does not adhere to the pulp, and varieties in which the flesh clings to the stone.

The varieties of both classes that are most desirable in this latitude, are given in the order of ripening:

YELLOW FLESHED VARIETIES.

Crawford's Early.—A fine, large Peach, of good quality, ripening early in September. The tree is very vigorous and productive, but not quite as hardy as some of the white-fleshed varieties. It brings the highest price in the market, and is a freestone variety.

Crawford's Late.—Very similar to the above, but perhaps a little larger and more hardy; ripens the last of September; freestone.

WHITE FLESHED VARIETIES.

Waterloo.—Medium to large, of fair quality, and ripening about the first of August; clingstone.

Early Rivers.—Medium to large; creamy white in color, and of good quality; August.

Mountain Rose.—Medium to large; round, with dark red cheek; flesh white, juicy and good; freestone; last of August or early September.

Oldmixon.—Medium to large; greenish white, with red cheek; flesh white, juicy and rich. The tree is hardy and productive, ripening its fruit in the middle of September. This is one of the most hardy and productive varieties.

Stump.—Resembles the last, but ripens much later and is perhaps equally desirable. The tree is very hardy and productive.

ADDITIONAL VARIETIES.

Schumaker,	Reeves' Favorite,	Excelsior,
Pratt,	Wheatland,	Wager.

GATHERING.—Unlike the apple and pear, the Peach reaches its highest excellence only when ripened upon the tree. This fact makes it, *in its best condition*, a local fruit and insures paying prices to the grower in Northern sections who will allow his fruit to ripen fully and market it carefully. It is true that large quantities are shipped from the sections where the fruit reaches perhaps greater perfection than in Northern latitudes, but on account of the necessity of its being picked while yet hard, it is sent to market before it reaches its best condition and is, in quality, much inferior to that grown with us, where our fruit is allowed to ripen upon the tree.

MARKETING.—In the South the Peach is gathered, often before fully grown, and packed in baskets or in crates of about one-half bushel. For the local market, to bring the highest price, it must become almost mellow before being picked, and should be packed in small baskets or boxes a single layer in depth, or at least, not more than two layers deep, and taken to market in such a way as not to roll or rattle about. In this way choice Peaches will often command from five to eight dollars per bushel.

INSECTS.—The only insect that is seriously injurious to the Peach is known as the

Peach Borer (*Ægeria exitiosa*)—Shown by the sketches—Fig. 45, male; Fig. 46, female, and Fig. 47, larva. This insect lays its eggs at various times from June to September, upon the trunk, generally near the ground, and the larvæ may be found in all

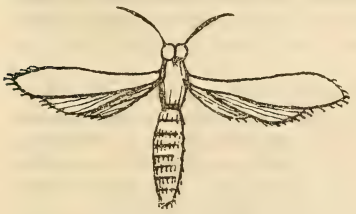


Fig. 45.

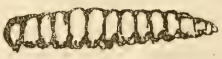


Fig. 47.

stages of development during the summer. Their presence may be known by the exudation of gum which always takes place from a fresh injury, containing the chips or droppings of the larvæ. The eggs hatch, and the larvæ penetrate the bark, and feed upon the inner bark and sap-wood, often eating a space the size of a silver dollar, as is shown in Fig. 48, which represents the trunk of a tree with the bark cut away, showing two borers, their burrows and the piles of gum and chips that have

Fig. 46.

Fig. 48.

exuded from the injured part. A single borer will often girdle a small tree, while in large trees are often found from five to ten borers. They generally confine their work to the trunk near the ground, but are sometimes found in the forks of the branches, where their injury often results in the tree splitting down when loaded with fruit.

The presence of the Peach borer is easily known by the chips in the exuding gum, and it is easily destroyed with a strong, pointed knife. The trees should be examined in June and August. No application to the surface is known to be wholly effectual, although, perhaps, the soap and tar or kerosene mixture may be of some value. In addition to any mixture applied to the trunk, careful examination should be made with the knife, as recommended above.

Diseases.—The only disease that seriously affects the Peach is known as "The Yellows." It is known in almost all sections of the country. In its worst form, the trees have a yellowish, sickly appearance, with small, wiry shoots coming out upon the large branches, as is shown at *a*, *a*, Fig. 44. The fruit ripens prematurely, is small, high colored, and often very bitter.

The exact nature of the disease is not fully understood. It is

certain, however, that there is present at certain stages bacterial or algoid ferments; but whether they are the cause of the disease, or simply accompany a weak state of the tree, or the natural decomposition of dead matter, is only conjecture. I am led to believe, after much careful study of the subject, that the latter is nearer the truth than the former, and that the trees are destroyed, in part or in whole, by the action of frost when the tissue has become weakened and imperfectly developed, from some or all of the many causes of weakness,—like exhaustion from overbearing, exhaustion of the soil, injury from borers, or a very late and imperfect growth caused by the use of too much nitrogenous manure, or by late cultivation. The injury is always first to the top, the root remaining alive often for a year or more after the top is dead; showing that the cause is the result of influences upon the top when in a certain condition. Trees that are exhausted, injured or weakened from any cause, have the same yellowish appearance as when attacked by the "yellows."

Remedy.—If the disease is not too far advanced, the trees may be restored to their natural color and vigor by the use of complete and abundance of plant food. For a single tree the following preparation, put on in the fall or early in the spring, is a good remedy:

Five pounds of pure ground bone.
Three pounds of muriate of potash.
One or two pounds of nitrate of soda or nitrate of potash.

In place of the ground bone and nitrate, from five to ten large shovelfuls of well decomposed stable manure may be used with nearly equal results. A mulch applied to the roots during the summer months will have the tendency to protect the roots from the effect of drouth and extreme heat, but it should be removed the last of August or first of September, that a late growth may not be caused by it. After freezing weather begins, the mulch may be applied again as a protection from injury to the roots from cold, and to prevent the starting of the buds during the winter.

In the growth of the Peach, the cultivator *should never let his trees become exhausted* and weak from injury of insects. Neither should he force a late growth by the use of nitrogenous manures during the summer, or by late cultivation. By constant attention to their wants, keep the trees in a healthy condition. Then I believe he may keep them in a productive condition for twenty, twenty-five or even fifty years.

Rotting of the Fruit.—In many sections, and especially during warm , wet seasons, the fruit (particularly of the early varieties) is very liable to rot, often destroying the entire crop. This trouble is mostly confined, however, to trees that are overloaded with fruit or that are in a poor soil.

Remedy.—Thinning the fruit will often prevent this injury, and the application of an abundance of plant food early in the season, when the trees are in blossom, will enable them to overcome the attacks of the fungus that causes the rot.

CHAPTER XIV.

THE PLUM (*PRUNUS DOMESTICUS*).

ORIGIN—PROPAGATION—NURSERY TREATMENT—ORCHARD MANAGEMENT—PRUNING—THINNING THE FRUIT—VARIETIES—GATHERING—MARKETING—DISEASES AND INSECT PESTS.

This is one of the most delicious and nutritious fruits and of easy cultivation. In the value of its products it stands one of the lowest.

ORIGIN.—The Plum is a native of Middle and Southern Europe, where it is known as the prune, and is largely imported to this country in a dried state and sold at five to twenty-five cents per pound, according to quality. The tree is hardy, productive and free from disease.

PROPAGATION.—Like the pear, the Plum is largely propagated by budding upon imported stock. Strong growing varieties, such as Myrobolan and St. Julien, are considered most desirable. If seeds from strong natural seedlings can be obtained they produce good stocks. The seed will be injured if exposed to the amount of drying that the peach pit often receives, and is best planted in the seed bed soon after gathering, although it will not germinate until the following spring.

NURSERY TREATMENT.—The seedlings, either imported or home grown, are transplanted to a deep, rich, moist soil in the spring, and should be ready to bud in August. The treatment in budding and training of the Plum is similar to that of the peach. At two years from the bud, the Plum trees are ready to transplant to the orchard.

ORCHARD.—The Plum succeeds upon a variety of soils, but gives the best results upon a deep, rich, moist loam. It is a tree that will bear high cultivation without danger of disease or injury from cold better, perhaps, than any of the large fruits, except possibly the apple.

The varieties differ very much in size and habit of the growth of the tree, and the distance for planting should vary from 12½ by 12½ feet, to 20 by 20 feet, according to the kind. The Green Gage and other small kinds may be planted the former, while the

Bradshaw, Lombard, etc., will require the latter distance. Trees two years from bud are most commonly planted, although a strong one-year-old tree often does equally well and costs less.

CULTIVATION.—The Plum, as stated before, will not be injured by a high state of cultivation; but, as with all other fruits, late working of the soil should be avoided. It is largely being planted in poultry yards, where the cultivation and fertilization is done to a great extent by the fowls, while the trees afford the necessary shade during the summer.

PRUNING.—Most of the varieties require the same attention while young that the pear tree does, as they also have a tendency to grow only three or four strong shoots, which become much extended, and when loaded with fruit are liable to be broken off. This may be remedied and the tree be made compact and close-headed by a little pinching the first two or three years. The form of the tree is naturally round and should be trained low on account of the ease of thinning and gathering the fruit.

AGE OF BEARING.—The Plum may be expected to produce paying crops of fruit at from four to six years from planting in the orchard. It naturally tends to injury by over-bearing, but if the fruit be thinned, the bearing condition of the tree will continue probably from twenty-five to fifty years.

THINNING THE FRUIT.—No fruit is more improved by this process than the Plum, and with no fruit will the work give better returns. When the fruit is from one-fourth to three-eighths of an inch in diameter, all imperfect and insect-bitten fruit should be picked. Only one Plum should be allowed to remain on each spur, and only one Plum to each three inches of the shoots. Where properly thinned the trees are seldom injured by over-bearing and the crop is often doubled in value.

CLASSIFICATION.—The fruit is divided into three classes—the green or yellow, the red, and the purple or blue Plums. Many varieties, however, partake in a greater or less degree of the characteristics of two or more classes.

YELLOW OR GREEN VARIETIES.

Green Gage.—This variety is generally taken as the standard of excellence among Plums. The fruit is small, round, greenish yellow, and of the most melting, delicious quality. The tree is small, rather slow in growth, but hardy and productive. The fruit is in season in September.

Imperial Gage.—Somewhat resembles the last in fruit, but is larger, round, greenish and not quite equal in quality. The tree is large, vigorous and productive. The fruit ripens from the middle to the last of August.

McLaughlin.—Large, round, greenish yellow, sweet and fine in flavor. The tree is a good grower and productive, ripening its fruit the last of August.

Washington.—A very large, round plum; green, often mottled or dotted with red; juicy, sweet and good. Tree remarkable for its large, glossy foliage, vigorous growth and productiveness.

Yellow Magnum Bonum (or Yellow Egg).—A very large yellow Plum, egg-shaped, but of rather coarse quality. The tree is vigorous and productive.

RED VARIETIES.

Pond's Seedling.—A very large, oval English Plum, red, changing to violet; rather coarse in quality, but its size and beauty makes it very attractive in the market. The tree is vigorous and productive.

Sharp's Emperor (Victoria).—A beautiful, large Plum; flesh rather coarse, but sweet, juicy and good. The tree is vigorous, but rather straggling in growth, with downy shoots, maturing its fruit about the middle of September.

PURPLE VARIETIES.

Bradshaw.—A very large, dark purple or almost black Plum, of fine quality. The tree is very vigorous and moderately productive. It is one of the most profitable varieties on account of its size and earliness, being marketable in August.

Lombard.—Medium to large; dark red or purple when ripe, and of fair quality. The tree is remarkably productive and succeeds in a great variety of soils, making it a very profitable variety.

Duane's Purple.—Very large, oval, reddish purple; flesh juicy and sweet; tree vigorous, with downy shoots, and productive.

ADDITIONAL VARIETIES OF VALUE.

Coe's Golden,	German Prune,	Gen. Hand,
Jefferson,	Smith's Orleans,	Reine Claude,
Shropshire Damson,	St. Lawrence,	Yellow Gage.

GATHERING THE FRUIT.—Like the peach, the Plum must be ripened upon the tree to reach perfection, and as the skin is thick and the flesh more firm than the latter, it need not be gathered until nearly in perfection for any except the distant market. When ready, the fruit, if for a fancy market, should be picked from the tree by the stem and laid carefully in small baskets, in single layers, that the bloom may not be rubbed off. The tree should be picked over several times, taking only such as are ripe. For canning or preserving such care is not needed; in fact, I believe the fruit is considered rather better for this purpose if gathered a little before fully ripe.

MARKETING.—The best prices are obtained when the fruit is put up in fancy packages (boxes or baskets), of one or two layers each. In this condition very choice fruit sells for from ten to twenty-five cents per dozen or per quart.

Fruit for canning, which is the smaller kinds and the sortings

of the larger varieties, is put up in baskets or crates and sells for from fifty cents to one dollar and twenty-five cents per peck.

Insects.—The Plum Weevil or Curculio (*Conotrachelus nenuphar*). This insect is shown at Fig. 42, which is reproduced here. This one insect, shown at Fig. 49, has done more to des-

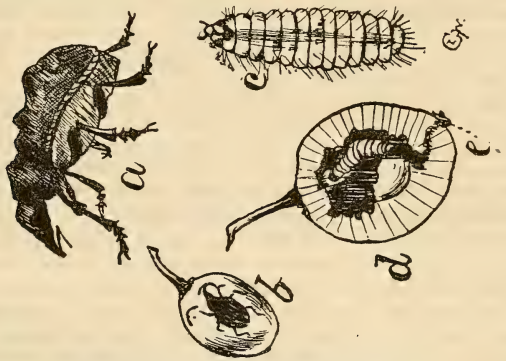


Fig. 49.—Reproduced from Fig. 42, Page 42.

troy the Plum crop of the country than all other causes together. When the fruit is the size of peas, the beetle *a*, punctures it, as shown at *b*, Fig. 49, making a crescent-shaped cut, in which it lays an egg. This egg hatches, and the larva or worm enters the fruit and destroys it, as shown at *e*, Fig. 49. The fruit soon falls off and the worm escapes to the ground, where it makes its cocoon and comes out the following spring.

Remedy.—The beetle is very sensitive to a sudden jar, looses its hold and falls to the ground, remaining with its legs drawn up as if dead until it thinks all danger past, when it attempts to

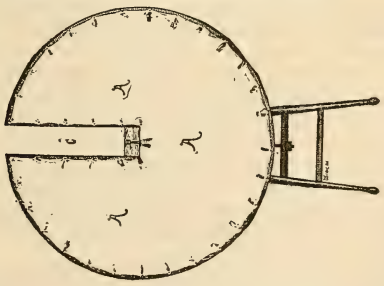


Fig. 50.

get away. Taking advantage of this habit, the trees may be jarred early in the morning and the insects caught upon expanded sheets large enough to extend under all the branches and des-

troyed. The sheets may be expanded upon square or rounded frames hinged together so as to be folded up, or they may be mounted upon a wheelbarrow for convenience of moving about, as shown in the accompanying Figure No. 47. The jar must be very sudden to bring down the prey, and is best done with a wooden mallet covered with a thick cloth pad or a long, heavy stick padded at the end. This work must be kept up for three weeks from the time the fruit is the size of a pea; it is effectual and not very expensive.

Planting the trees in poultry-yards is also a sure way to secure the fruit from the attacks of the curculio. The fowls probably catch the beetles as they come out of the ground, and also the larvæ as they escape from the fruit. If planted in large quantities, probably the addition of swine to destroy the falling fruit containing the larvæ would be advisable.

The Peach-Borer, Fig. 48, Page 56, is often injurious to the roots of the Plum, and the same remedy should be applied as for the peach-tree.

The Rose-Bug, described under those insects injurious to the grape, Page 80, is often very destructive to the foliage, especially to young trees. The application of pyrethrum powder, especially the kind known as Buhach, if applied in the evening, will paralyze them so that the bugs will fall upon the curculio frame, when they may be very easily destroyed.

Diseases.—*The Black-Wart* or Black-Knot, is the most destructive disease that the Plum is subject to. It is a fungus, (*Sphœria morbosa*,) the spores or seeds of which germinate upon the tree, generally upon the branches, in the spring. The roots of this fungus plant, known as the *mycelium*, penetrate the tissue of the Plum tree; the tree puts forth an increased growth to overcome or overgrow the injury of the fungus itself, thus producing the black wart, so often seen upon old Plum trees and the common sour cherry. The spores of this fungus do not ripen until winter, when they are scattered, and are ready to germinate again in the spring.

The Remedy.—No application has as yet been discovered that will destroy or stop the growth of the warts when they appear. They must be removed with the knife as soon as they begin to develop and be burned. Cut out every vestige of diseased wood, whether upon the trunk or branches. If a large cut is made upon the trunk or main branches, the wound should be covered with paint or grafting wax. Healthy, vigorous trees are much less liable to this disease than weak ones.

Rotting of the Fruit.—This occurs, as in the peach, in moist, warm weather, and when the trees are overloaded. If the directions given for the production of choice fruit and the production of healthy, vigorous trees be followed, the grower will not be much troubled by his fruit rotting upon the trees.

CHAPTER XV.

THE QUINCE AND CHERRY.

ORIGIN, PROPAGATION AND GENERAL MANAGEMENT OF THE QUINCE AND CHERRY.

The Quince, *Cydonia (Pyrus) vulgaris*, is a native of Middle and Southern Europe, where it was known and esteemed from the earliest records of those countries. It is not a fruit that can be used for dessert without cooking, but its aroma and peculiarly agreeable flavor makes it a much prized fruit for preserves. On account of the limited use that can be made of the fruit, it will probably not be found profitable if grown in very large quantities.

PROPAGATION.—The Quince is readily propagated by layers, stools, and by root-graft.

Layers.—This consists in budding-down the lower branches in the spring, and, after having pared off the bark upon the underside, they are covered with five or six inches of rich, moist soil. In the autumn roots will have been thrown out and the layers may be cut off and planted in the nursery rows.

Stools.—This is a modified form of the layer. Stocks that have been planted one or two years are cut off near the ground, and from these numerous shoots will spring up. These are banked up with rich soil the following spring, and in the autumn they will be found well-rooted layers, and are to be separated from the stock and planted in the nursery. After about two crops of layers have been taken from the stool, they are allowed to grow again for a year or two before banking up again.

Root-grafts.—Perhaps the most rapid method of propagation is by grafting upon pieces of apple-roots. This is done during the winter, as directed for the apple, upon the trimmings of the apple seedlings that were used for apple root-grafts, or those not large enough for that purpose or for budding. These root-grafts are planted in the nursery, in rich, moist soil, and at the end of one

season are taken up, when it will be found that the union of the scion with the root has been but slight and that numerous roots have been sent out from the scion. The apple-root is now broken off and the Quince part, which is now a well-rooted cutting, is planted in the nursery again in the same condition as the rooted layer before described. Propagation by cuttings is too uncertain to be profitably employed.

Nursery.—This should have a deep, rich, moist soil, and the layers or rooted cuttings after planting should be trained to one shoot. In from two to three years the trees will be of the proper size to plant in the orchard. The advantage of training the Quince in tree form, although it naturally grows in the form of a large shrub, is that the trunk is sometimes attacked by borers and if there are several trunks the borers are certain to work upon the inside, where it is almost impossible to get at them, while with a single trunk the entire surface may be quickly and effectually examined and the borers destroyed before they can do much harm. Fig. 51 illustrates the form the tree would nat-

Fig. 51.

Fig. 52.

urally take if unpruned, while Fig. 52 shows one pruned to the tree form. Good fruit may be grown in either form, the size and quality depending more upon the amount of food in the soil than the form of the tree.

The Orchard.—The best soil for the production of Quince fruit is a deep, rich, moist loam; not one containing stagnant water, but well underdrained, natural or otherwise.

The distance for planting may be ten by ten, or twelve by twelve feet, according to the nature of the soil; in a very rich soil give them more room than if it is poor. The Quince has a large number of fine roots, and consequently is easily transplanted with success.

No fruit responds more quickly to good cultivation and manuring. A late growth, however, is to be avoided by the application of plant food in autumn and early spring. All cultivation should cease after August 1. For the production of fruit, use potash and ground bone.

Little or no pruning is required after the tree has become established, except to cut off the suckers as they appear upon the trunk or from the roots, and to keep the head in good form.

In good soil, the Quince begins to bear paying crops of fruit in from four to six years from planting in the orchard, and continues to bear, with good treatment, for from twenty to forty years.

HARVESTING.—The fruit should not be gathered until it begins to turn yellow, when it may all be picked at once. Like the varieties of apples with a yellow skin, it must be handled with care, as severe bruises will make marks upon the surface.

The fruit may be kept for one or two months in any cool cellar or shed, but to keep it beyond this time requires cold storage. It does not generally pay to keep the Quince much beyond its natural season of ripening, as it meets the most ready market during the time when canning and preserving are mostly done.

VARIETIES.—There are but few varieties in cultivation, and these show less distinctive characteristics than those of almost any other kind of fruit. Among the best are :

Orange.—This is an old standard sort, nearly round in form, and of a light yellow color; tree moderately vigorous and productive; of fine quality.

Rea's.—This is claimed to be larger and more productive than the Orange, but it is no better in quality than the Orange.

Champion.—A new variety originated in Connecticut. The fruit is large, of the same form and color as the Orange, said to be of better quality, and comes earlier into bearing. My experience with this variety is confined to young trees budded upon the Orange stock. In this condition it is evidently a little earlier in bearing than the Orange or Rea's, but this earliness may be due to the fact that they are budded trees. Any variety may be made of better quality, and larger and finer in form, by good cultivation than if neglected.

The Pear Shaped Quince.—This is an old variety differing from those mentioned above in form, but rapidly going out of cultivation.

DISEASES. The Quince is comparatively free from disease. It is sometimes attacked by the twig-blight. This is similar in appearance to the fire-blight in the pear, but seldom destroys more than the ends of the shoots. These should be removed and destroyed by burning, as soon as they appear, for the sake of the appearance of the orchard, if not to prevent it from spreading. The trees are sometimes destroyed by cold where they make a late, coarse growth; the remedy or preventive has been previously described.

INSECTS.—The only insects that are seriously injurious to the Quince are the borers that attack the apple. They are to be destroyed as described under that subject.

CHAPTER XVI.

THE CHERRY.

The Cherry (*Prunus cerasus*), originated in Asia and was first introduced into Italy from the town of Cerasus, from whence comes its specific name. It is a very delicious, healthful fruit, easily grown, but on account of its perishable nature is not generally considered a profitable crop.

Propagation.—Varieties are propagated by budding upon seedlings in the nursery. The seedlings are imported or native, and are easily grown. The seed, which is generally imported, should be from strong, vigorous seedling trees, known as the Mazzard stock, and should be planted as soon as gathered, or preserved in sand to prevent too much drying, which is liable to injure the vitality of the seed. The best soil for the seed-bed is a light, rather rich, warm soil. A too rich soil, however, causes an over-growth that is undesirable.

The Nursery.—The seedlings planted in a light soil in the nursery, are budded in August. This is considered one of the most difficult seedlings to bud on account of the very watery nature of the sap. The buds take best when the stock is just maturing, or where the growth is rather slow. In setting the bud, care should be taken to cut it evenly and smooth, and to bind very firmly, cutting off or heading-in the top of the seedling after the bud has been tied.

In grafting large trees, the work must be done early in the spring,—from April 1st to the 15th in this latitude of Massachusetts—to be successful. At two years from the bud the trees are ready to transplant to the orchard.

The Orchard.—The best soil for the growth of this fruit is one rather light and moderately rich. It is often found growing vigorously and in perfect health along roadsides in turf where the growth matures early and where the roots are well protected from the extremes of heat and cold. In very rich or moist soil the tree is generally injured in the winter by the action of the frost which bursts the bark and causes large cracks in the trunk, gen-

erally upon the south side. This injury is often followed by a gradual dying of the tree, similar to the effect of the "yellows" in the peach.

The distance required for setting the trees is fifteen by fifteen feet for the smaller growing kinds, and twenty by twenty feet for the larger sorts. If the land is cultivated, it should be only during the early part of the season. The trees should be planted around the borders of lots or about stone walls, unless planted in large quantities.

Very little pruning is required, the tree generally taking a perfect form without much care. Proper attention should be given, however, to the formation of the head at the proper height while the trees are small.

HARVESTING.—The Cherry must be allowed to ripen upon the tree to reach perfection; for canning purposes and preserves it may be gathered before it reaches this stage. It should be picked with the stems on, as in that condition it keeps much longer. The Cherry is generally marketed in the common quart strawberry boxes packed in crates. On account of its perishable nature large quantities cannot be disposed of unless they are very nice. In large orchards, the best way to dispose of the crop is to sell them to canning factories or to have canning or evaporating facilities upon the grounds.

CLASSIFICATION AND VARIETIES.—The fruit is divided into four classes, under each of which I give a few of the best sorts.

HEART CHERRIES.—Trees erect and pyramidal; flesh tender, juicy and sweet.

Black Tartarian.—One of the largest black Cherries; of the best quality and very productive; middle to last of June.

Early Purple.—A very early Cherry of medium size and fair quality; ripens early in June; tree moderately vigorous and productive.

Gov. Wood.—One of the finest yellow or light red Cherries; tree vigorous and somewhat irregular; last of June.

Downer's.—A very desirable late red Cherry of medium size and must be fully ripe to be good; tree vigorous and productive; July.

BIGARREAU CHERRIES.—Similar in form of fruit to the Heart Cherries, but the flesh is very fine and sweet; tree more spreading.

Yellow Spanish.—Large, pale yellow, with red cheek; flesh fine, melting and sweet; one of the best but often rots on the tree; last of June.

Cleveland.—Large, red and yellow; juicy, rich and sweet; middle to last of June; tree vigorous and productive.

Rockport.—Large, pale-amber and red; flesh tender, sweet and good; tree erect and vigorous.

Tradescants.—Very large, black, fine, juicy and good; tree vigorous and very productive; middle of July.

Duke Cherries.—The trees are round in form, with strong shoots, and the fruit generally sweet.

May Duke.—An old variety of good quality, large, dark red, tender and rich; tree vigorous, hardy and productive; middle of June.

Royal Duke.—Very large, of good quality, and ripens a little later than the last; vigorous and productive.

Reine Hortense.—A French variety of great value; large, juicy, sweet and good; tree remarkably vigorous and erect.

Morello Cherries.—Head round, shoots slender, tree of small size and fruit acid.

Early Richmond.—A large, early, red Cherry, valued especially for cooking and preserves. It is more extensively grown perhaps than all other kinds together. The tree is vigorous and remarkably productive, ripening its fruit in June.

Belle Magnifique.—A very large, late Cherry of better quality than the last; tree vigorous and productive; middle to last of July.

Diseases and Insects.—The Cherry is comparatively free from destructive diseases. In moist, unfavorable seasons, a mildew sometimes attacks the leaves, doing some injury, and may be avoided by good cultivation.

The Cherry Aphis or Louse (*Mysus cerasi*), is the small, black aphis that appear so abundantly upon the leaves and young shoots of the Cherry tree in summer. It is injurious by sucking the juices of the plant, causing the leaves to curl and the growth to cease.

The lice are destroyed with a strong solution of soap and tobacco water, and also by dusting with pyrethrum just at night. With young trees, the branches may be bent down and dipped in basins of the above solution.

The Rose Bug, described on Page 80, in the chapter on the grape, is often destructive to the foliage and may be destroyed by placing the curculio screen under the tree and applying the pyrethrum or Buhach powder, when they will all fall to the ground paralyzed.

The Plum Curculio often punctures the fruit and the worms found in the Cherries are its larvæ. Upon young trees the jarring process of destruction may be followed, but the use of poultry is much more satisfactory, when the trees become large.

CHAPTER XVII.

THE GRAPE.

(*Vitis labrusca*, the Fox Grape; *Vitis cordifolia*, the Frost Grape; *Vitis vinifera*, the European Grape.)

It is difficult to say at this writing whether this fruit should take the second or third place in the value of its products. Its cultivation has increased at an amazing rate in the past few years, and, owing to its ease of culture, its long-keeping qualities, and its value as a healthful and nutritious article of food, it should have the second place in importance, if not for the money value of its products.

ORIGIN AND HISTORY.—All the varieties of Grapes now cultivated are native seedlings and have originated from one or more of the above species. In 1820, only one or two of the varieties now cultivated were known in any section of the country and all that are especially valuable have originated within the last twenty-five or thirty years. A few of the best varieties are the result of hybridization, but most of them are chance seedlings, or seedlings of such hardy and reliable sorts as the Concord. The introduction of foreign blood, as it is called, or the crossing of our common fox grape with varieties of the European, has always resulted in a weak vine, liable to mildew and to injury from cold. Our greatest hope of securing the perfect grape is from seedlings in which the improvement in quality is due to the natural influences of cultivation.

PROPAGATION.—The Grape is propagated by cuttings, by layers and by grafting.

Cuttings.—Grape cuttings are of two kinds, the long, Fig. 53,

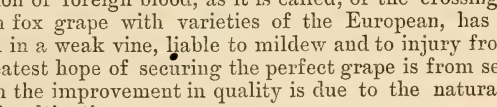


Fig. 53.

and the short, Fig. 54. The long cutting is made of two or more buds of the last season's wood of medium size, and from six to

eight inches in length. These should be made in the fall and be

Fig. 54.

planted before the ground freezes; or be tied in bundles of twenty-five and preserved by burying in soil where there will be no standing water; or in a cool, moist cellar, in sand. In the spring they are planted in rich, moist soil, with the upper bud just at the surface of the soil.

In planting, the main condition of success is to press the soil very firmly about the base of the cuttings. Cuttings planted in the fall should be covered with some mulchy material to prevent their being thrown out by the frost. Most of the common kinds may be propagated in this way. The Delaware, and a few others, however, fail to root from long cuttings and must be grown by short cuttings.

The short cutting consists of a single bud and from two to three inches of wood, cut in various ways. The most common form is shown in the above figure, No. 54. These cuttings must be rooted in sand and by the aid of artificial heat. They are made in the winter and put in beds or boxes of sand the cuttings being one or two inches apart, and the boxes or bed having bottom heat; that is, with hot water or steam heat or fermenting stable manure, under them. The conditions under which they are most successfully rooted are, a temperature of the soil or sand of fifty or sixty degrees and that of the atmosphere forty or forty-five degrees. When well rooted, the cuttings are transplanted to boxes of soil; or, if the danger of frost is past, to the open ground. Short cuttings make better plants than those from long cuttings, if they are properly treated, as the roots all come out from nearly the same point, very much like those of seedlings.

Layers.—Layering the Grapes is done during the summer, when it is called a summer layer, or in the spring, when it is called a spring layer. A summer layer consists of a shoot of

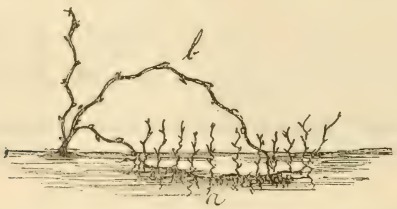


Fig. 55.

the present season's growth, bent down early in July and covered with six inches of moist soil. Before covering it is best to

cut off a thin layer of bark along the underside of the cane, which will facilitate the emission of roots. At the end of the summer or the following spring, this cane is cut from the parent vine and will be found a well-rooted, strong plant.

By the spring method, Fig. 55, as many plants may be produced from one layer as there are buds upon the cane laid down. When the layer is to be made, a trench is dug six or eight inches deep, in which is laid the cane of the last season's growth, fixing it firmly in the bottom by the use of forked sticks or stones, as shown at *a*, Fig. 55. This remains uncovered until the buds have sent up about ten inches' growth, when the soil is thrown in.

It will often be found that the buds near the parent vine and those at the end of the cane will grow first and more strongly than those in the center. To overcome this, the cane should be bent up and the end stuck into the ground, as shown at *b*, Fig. 55. The bending checks the flow of sap at the end of the cane. The sap rises more rapidly to the highest point and the result is an increased growth of the center buds.

At the end of the season, roots will be found coming from around the base of each shoot, and by cutting the canes between the nodes we have as many good vines as there were buds upon the covered part of the cane.

By no other method can as many vines be as certainly obtained as by the spring layer, and the process is so simple that he who has one vine may rapidly increase his stock.

GRAFTING.—With no other fruit is grafting so uncertain of success as with the grape vine. Various methods have been suggested, but perhaps the one described below is the most certain. In the fall, just before the ground freezes, take any strong stock that you wish to graft; and, removing the soil from the roots, cut the main cane off a few inches below the surface. Upon this is to be practiced cleft-grafting. The stock is now split (if very tough and gnarly a saw may be used to split it), and scions of one or two buds are cut and inserted, as illustrated by Figs. 20 to 24, Pages 23–24. After the wedge has been withdrawn, the soil is pressed closely about the graft, no wax being used, but covering it up to the top bud of the scion. Over this scion is placed an an inverted small flower-pot, so that when the soil is removed in the spring the scion may not be disturbed.

The whole work is now covered with at least a foot of soil, and as severe weather approaches, over this is thrown enough litter to prevent the ground around the stock from freezing. In this way, if the grafting is successful, a very strong growth will be made the next season, and the second year a fine crop of fruit may be expected. I have known a single bud placed in a stock less than three-fourths of an inch in diameter to make a growth of two canes over eight feet long the first season. This affords a good way of testing new varieties, and is one of the most certain methods of grafting the vine that I have tried, but I would not count upon more than three successes in five trials.

THE VINEYARD.—The best vines for planting in the vineyard are No. 1 one-year-olds from cuttings or layers. These should not have made less than eighteen inches of wood, and have a large mass of fibrous roots.

The best soil is a light sandy or gravelly loam that does not suffer from drouth; and if on an elevation sloping to the south, the fruit will be of much finer quality and will be less liable to injury from late frosts in the spring or early frosts in the fall. The more small stones in the soil the warmer it will be, and the richer and earlier the fruit.

Before planting, the land should be thoroughly prepared and marked out with a marker or with a plow. If very accurate spacing is desired, the marking or staking should be done with the line or wire. The soil should be made moderately rich by the use of well-rotted stable manure or bone and potash.

The distance of planting is from six by ten feet, to ten by ten feet according to the vigor of the variety and the mode of training. For all but the very small growing kinds, like the Delaware, Lady, etc., I think the latter distance the best. The nearer they are planted, the less space the roots will have in which to develop and the more fertilizing material will need to be applied, and vice versa.

The most rapid way of planting is to furrow out the land both ways, and the vines are planted at the intersection.

Before planting, the top of the vine should be cut off to two or three buds, and if the roots are very long, it is well to cut them back to ten inches in length. Having prepared the vine, the hole is prepared with a spade by taking out three or four spadefuls of soil at the intersection of the furrow previously made, in such a way that the soil in the center will be a little higher than that on the border of the hole, so that the ends of the roots may be planted about eight inches deep while the crown of the root shall be covered only four or five inches. Spread out the roots in all directions and fill in with good surface soil, pressing it very firmly in place. If the soil be very poor, a handful or two of fine ground bone may be worked in with the soil about the roots with great benefit.

CULTIVATION.—The land of the vineyard may be planted for the first two years with some low-hoed crop like potatoes or beans; provided a little more plant-food is returned to the soil in the fall or spring than is taken up by the crop removed. Perhaps there is nothing better to grow in the newly-set vineyard than the bean crop, as cultivation would cease early in July; while the land would be disturbed by digging the crop of potatoes so much and so late as to cause a late growth of the vines. No crops should ever be planted in the vineyard that will shade vines.

PRUNING AND TRAINING.—*The First Year.*—During the first summer, the vines will require no care except to see that they are not injured in cultivating the other crops. They will grow

better and mature their wood more thoroughly, lying upon the ground, than if supported by stakes.

At the end of the first year's growth, or before the sap begins to move in the spring of the second year, the top of the vine should be cut back to one strong cane of three buds. It is perhaps best to do this in the fall of the first year, and then cover up the end of the cane with one or two shovelfuls of soil to protect it from the winter.

The Second Year.—Only one cane should be allowed to grow the second year, and this should be tied up to a stake. Any kind of a stake that is four or five feet high will do for this purpose. All laterals that may start from the buds at the base of the cane should be pinched off as soon as they are four or five inches long, and all the growth forced into the main cane. When the cane has reached the top of the stake, the end should be pinched. This will cause it to become thick and stocky, and the wood to mature more fully. At the end of the second year the cane may be laid down again to protect it from injury.

SUPPORTS AND TRELLISES.—The vine has now reached a stage where it needs some permanent support. Two methods are commonly employed by vineyardists for supporting their vines, stakes and trellises. The advantages of the first are that the vines can be cultivated both ways with the horse during the spring and early summer, and that material often obtained very cheaply from one's own land may be used for stakes, while the trellis is more durable and the vines require less support to keep them up from the ground.

STAKES.—In this method various kinds of stakes are used.

Fig. 56.

Fig. 57.

Some vineyardists use only one stake (Fig. 56), and others use two stakes, one about eighteen inches each side of the vine, as shown

in Fig. 57. The chestnut, larch and cedar posts are of about equal durability. Posts of sawn two by three-inch stuff are often used, and have the advantage, that if they are renewed just before they break off, the new stakes may be easily inserted where the old ones were removed without making a new hole, if the work is done in the spring.

TRELLISES.—In this method, many kinds of trellises have been used, but the best and most commonly used is made of posts, nine feet long, set from fifteen to twenty feet apart, and three feet below the surface. The end posts should be large and well braced, while smaller ones may be used in the middle. Upon these posts (Fig. 58) are placed three or four No. 14 galvanized wires, the first one being not less than two feet from the ground. These are fixed in place with staples, and the wires are stretched by means of levers or by the common barbed-wire stretcher. No. 16 wire is sometimes used, but is rather small to support a great weight of vine and fruit; and the larger the wire the more distant can the posts be set.

TRAINING.—Having the stakes set or the trellis made the third year, the vine must be established upon the supports. If the stakes are used, the system of training consists in simply winding one cane arounde ach stake, and fixing it in two or three places so that it shall not slip down (Figs. 56 and 57). The string of any coarse, strong material, should be tied with a loop around the vine so as to allow for the increase in size by growth.

The third season the fruit is borne upon the laterals from the main cane, but the fourth year it is borne upon spurs made by cutting these laterals back to three buds in the fall or winter, as shown at *a*, Fig. 58. The pruning each year after the vine

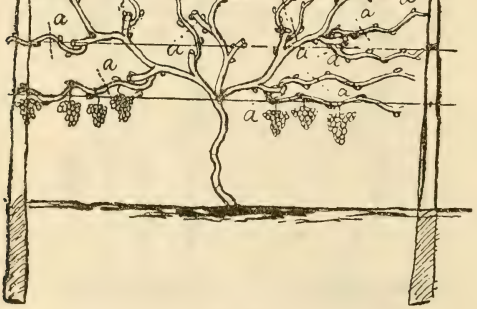


Fig. 58.

has become established consists in simply cutting back the last season's canes to spurs. Only a limited number of spurs should

be allowed to remain, according to the strength of the vine, cut-

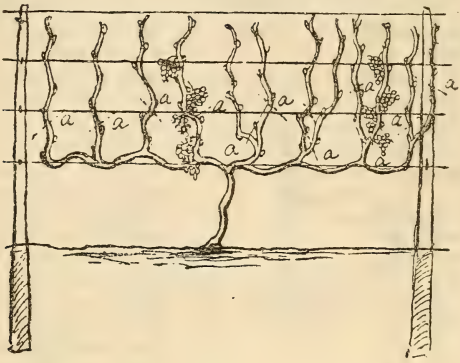


Fig. 59.

ting away all weak shoots. From each of the spurs should be allowed to grow one or two canes, and upon each of these there should not be allowed to mature more than two bunches of Grapes, and if the vine is not strong, only one bunch.

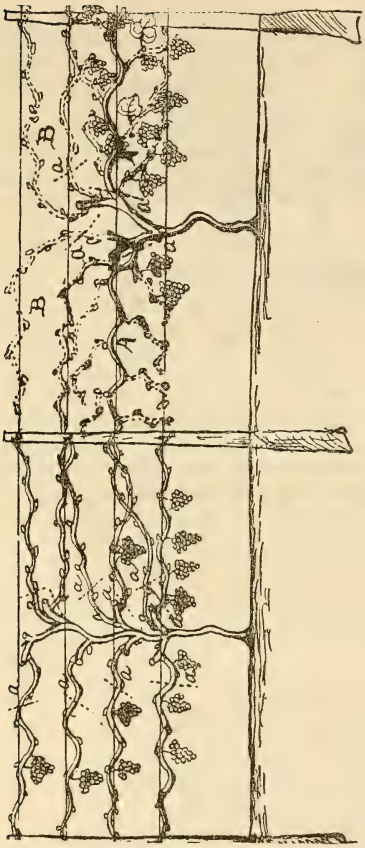


Fig. 60.

Upon the trellis the vine may be established in a natural fan system (Fig. 58), in the vertical arm system (Fig. 59), or in the horizontal arm system (Fig. 60).

All the various systems by which the vine is trained may be brought down to two—the spur system, and the renewal system. By the spur system all the canes at the end of the season are cut back to three buds, as shown at the dotted lines *a*, Fig. 58. By the renewal system, canes are grown this season for fruiting the next; while the cane that has borne fruit, is cut back to a spur from which is grown the cane to produce the fruit the next season.

The two systems are practiced with various modifications, but the whole secret of success lies in the amount of strong, thoroughly ripened wood that can be produced and of allowing only a small number of large, perfect bunches to remain upon the vine.

The thinning of the fruit should be done as soon as the grapes are the size of peas. All the small bunches should be removed and only one or two be left upon each new shoot, according to the strength of the vine. Under the best of cultivation a vine four or five years old may produce from five to ten pounds of choice fruit; and as it increases in size and vigor, it may produce as high as twenty pounds. The average for vineyards, in full bearing, will not be over ten pounds of choice fruit per vine.

PRUNING.—The beginner in Grape-growing is often much troubled about the best time to prune the vine and the best methods of pruning. With vines that are well established the work is very simple and consists, in the spur system, in cutting-

back all the strong shoots to three buds and removing entirely all weak canes not needed to carry out the system. In the renewal system, those shoots that are to remain for fruiting next season are shortened to a proper length, and the shoots from which the new canes are to be grown are cut back to spurs. All wood, not needed to carry out the system, is cut away.

The best time for pruning is in the fall or winter. Pruning after the sap begins to move in the spring, or after the middle of March, cannot be recommended, although there is no evidence to prove that the vines are injured by the "bleeding" that takes place when pruned so late.

The best implement for pruning is the common hand .pruning

Fig. 61.

shears, of which there are many good patterns. The dotted lines at *a*, Figs. 61 and 62, show where the cuts are to be made.

Fig. 62.

Pruning Old Vines.—In many gardens there are to be found old vines that have not been pruned for years, and the fruit is small and almost worthless. The owner still neglects it because he does not know how to take hold of the vine and put it into shape. Such a vine, with a little care, may be made productive, and can easily be brought under some system of pruning. The first thing to do in the fall, is to cut, and cut, and cut away until the vine consists of the necessary arms, branches or laterals to allow a single one to each wire, stake, slat or other support used. From these branches during the following summer will come out numerous sprouts. Such of these as are needed to re-

place the old canes or to furnish fruit spurs are preserved, and the others rubbed off before they have made much growth. At the end of the first season, or at least of the second, the vine will consist of new wood, and any of the various systems may be carried out with it. In the case of such old vines, unless canes of one year's growth can be found for arms, no fruit will be produced the year after the first pruning. No fear need be had that the vine will be injured, as winter pruning generally tends to increase growth rather than diminish it. This is just the opposite of summer pruning.

Summer Pruning.—In order to force the growth into the canes that are to produce the fruit and the canes for renewal, summer pruning is resorted to. This consists in pinching out the end bud of the fruiting cane when it has reached two or three feet beyond the last bunch of fruit; and pinching back the renewal cane when it has reached the length required for the kind of support used.

A large amount of foliage should never be removed from tree, vine or plant, unless to check its growth, for it is certain to result in injury. The maturity and perfection of the fruit, and in fact that of the whole plant, depend upon the amount and vigor of the foliage; and the common idea that removing the foliage to let in the sun hastens the ripening process, is wholly wrong. The best fruit is always found under the foliage shielded from the hot, scorching sun.

Gathering the Fruit.—Unlike some other fruits, the Grape does not improve in quality after removal from the vine, and consequently must be allowed to remain upon the vine until ripe. A very certain indication of the maturity of the Grape is when about one-half inch of the stem where it joins the cane has turned brown like the bark of the cane. Light frosts will injure partially ripened fruit, but when fully mature, it takes a freeze to seriously injure it.

To retain the beauty of the fruit, that is, not to injure the bloom, the bunches must be removed by taking hold of the stems and breaking them off or by cutting with a knife or scissors. Where large quantities are to be gathered, large shallow trays are used upon which a single layer of bunches is placed; then the trays are carried upon a rack to the packing or storing room. Small quantities may be picked in the field, trimmed and packed in baskets or trays ready for market.

Packing and Shipping.—For a distant market, only thick-skinned kinds can be successfully shipped. These are sorted, all the imperfect berries cut out; the bunches are then packed closely in small baskets holding from five to ten pounds. For local markets, they are taken to the dealer in trays or shallow baskets, in a single layer, so that the bloom will not be injured.

Preserving.—The Grape is a fruit that may be easily kept much beyond its season. The most perfect conditions for pres-

ervation are a moist, cool atmosphere, and the temperature about 35°. This is only obtained by the use of ice. In this section, varieties like the Concord, that ripen from the first to the middle of September, may be kept until the last of November under such conditions. Thick-skinned kinds may be preserved later in a cool, dry place, by packing in single layers of cotton wool in a close box, but the stems generally shrivel and the berries are likely to drop.

CLASSIFICATION.—Varieties are classified into black, red and white.

BLACK VARIETIES.

Moore's Early.—For its extreme earliness, for the northern fruit belt, this must be placed first. The vine is a pure native, hardy, moderately vigorous and productive; berry very large, round, and nearly black; bunch medium and large, with much less bloom than the Concord; quality fair, equaling the Concord and ripening ten days earlier.

Concord.—For vigor, hardiness and productiveness, this is still unequaled. In quality it is only fair and with a thin skin. It is still "the Grape for the millions," and is too well known to need further description.

Worden.—A seedling of the Concord, and in some sections said to be superior to that variety. It resembles its parent in all particulars, but may be a little earlier and of better quality.

Wilder (Rogers' No. 4).—A hybrid Grape of large size and fine quality; bunch large and showy. With careful culture it may be found profitable.

RED GRAPES.

Delaware.—This little Grape is everywhere known. It is hardy, productive, but slow in growth, and the thin leaves are liable to injury from mildew. The fruit is of the best quality. The Delaware requires careful and rich culture.

Brighton.—Medium to large, of good quality, and ripening with the Concord. Color rather dark red, which is an objectionable color for a market Grape; of fair quality and a good keeper.

Vergennes.—A red Grape of more recent introduction, but especially valuable for its late keeping qualities.

WHITE GRAPES.

Lady.—A small Grape of good quality; vine rather slow in growth, but hardy and productive.

Martha.—An old variety, with vine resembling the Concord; fruit medium in size and of fair quality.

ADDITIONAL VARIETIES OF MERIT.

Rockwood, Jefferson, Niagara, Francis B. Hayes.

GIRDLING THE GRAPE.—In our northern sections, frosts come so early that even the Concord often fails to ripen, and there is need of some process by which even later varieties of high quality may be ripened with certainty. Such a process is found in what is known as girdling or ringing. It consists in taking a ring of bark out of the growing cane, just below the fruit as shown in Fig. 63. The girdling should be done about four weeks in advance of the usual time of ripening. The effect of this is to cause a rapid increase in the size of the fruit and to hasten its maturity from ten days to two weeks. In a series of experiments, made at the Massachusetts Agricultural College, it was found that the quality of the fruit was not injured by the girdling, nor could any perceptible injury be discovered to the vine. The ring of bark may be removed rapidly with the knife, Fig. 64. The use of strings or wires twisted tightly around the canes will probably answer the same purpose as the removal of the ring of bark. Only those canes that are to be cut away entirely at the end of the season should be girdled. The cane is girdled at *A*, Fig. 63,

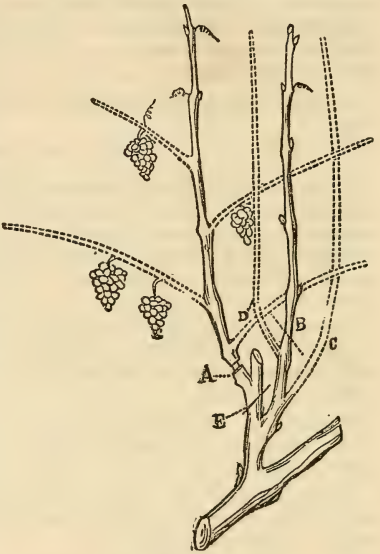


Fig. 63.

Fig. 64.

and after fruiting is cut back to *E*, leaving two canes, *C* and *D*, for the continuation of the treatment. The cane *B* is to be cut back to one or two buds at the fall or winter pruning.

INSECTS.—The Grape is a fruit generally one of the least subject to injury from insects. Some seasons the Rose Bug, which is too common to need description, plays havoc with the blossoms, just as the fruit is setting, and in a few sections has done some injury to the foliage. It is an insect that nothing seems to destroy, but it may be paralyzed by the use of the pyrethrum powder, applied just at night, when the bugs may be caught upon

the curculio screen. Hand-picking, which has been resorted to by some growers, is too expensive except upon very choice vari-

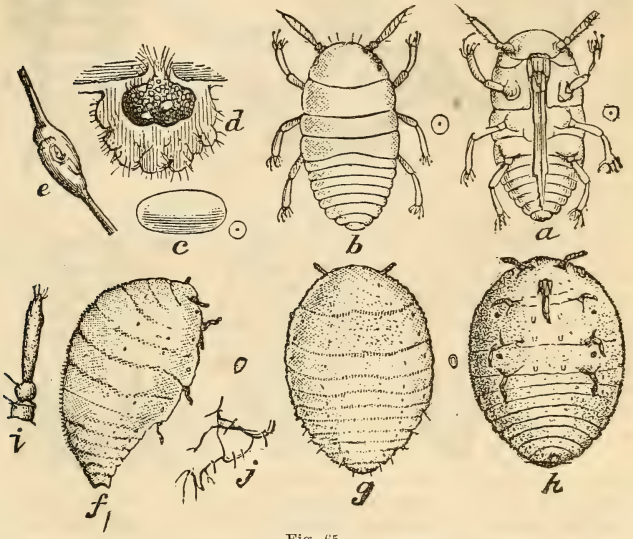


Fig. 65.

eties. It is claimed by the Buhach company that their preparation of pyrethrum will kill this pest. Should this prove to be the case, the screen will not be needed.

Phylloxera or *Grape Vine Louse* (*Phylloxera vastatrix*).—This is the insect that is so destructive to vines of European vineyards, and has destroyed thousands and thousands of acres of vines there. It is a native of this country and by some means was transported across the Atlantic and has propagated and developed with great rapidity upon the more tender European Grapes. It is generally found in two forms, the leaf and root form. The former is very small, not over one thirty-second of an inch in length, of a light yellow color, and sucks the juices of the leaves and tender branches, causing small warts or galls upon them. The leaf forms of the Phylloxera is shown at Fig. 65: *a*. front view of the young louse; *b*, back view of the louse; *c*, the egg; *d*, a section of one of the galls; *e*, a swollen tendril; *f*, *g*, *h*, mature egg-bearing gall-louse, lateral, dorsal (or back), and ventral (or belly) views; *i*, the antenna; *j*, the two-jointed tarsus.

The root form (Fig. 66) is of about the same size and causes similar swellings upon the fibrous roots. Fig. 66, illustrates the root phylloxera: *a*, the roots of a Clinton vine, showing the swellings; *b*, young louse in the hibernating stage; *c*, *d*, antennæ

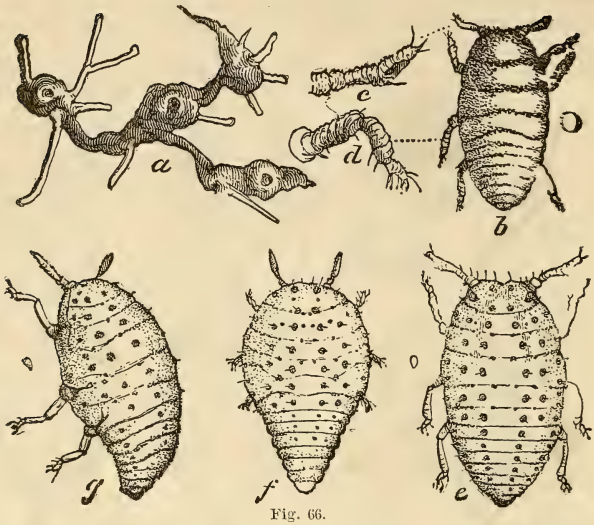


Fig. 66.

and leg of the same; *e*, *f*, *g*, matured lice. In Fig 67, *a*, is a healthy root; *b*, a root on which the lice are working; *c*, a root

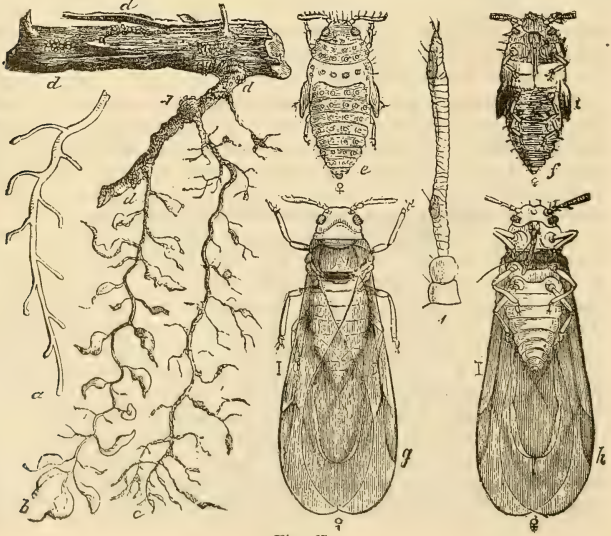


Fig. 67.

which they have ravaged and deserted, and which is decaying; *d*, *d*, *d*, lice on large roots; *e*, the female pupa, seen from above; *f*, female pupa, seen from below; *g*, winged female, dorsal view; *h*, the same, ventral view; *i*, antenna of the winged insect.

While the insect is almost always found upon our native vines in large numbers, especially the root form, their vigor of growth seems to overcome its attack, and no permanent injury results. No remedy has been successfully applied.

DISEASES.—Varieties that have originated from the European grape, wholly or in part, are often subject to the *mildew*, as are also native varieties under certain conditions. It is a fungus parasite that grows in the tissue of the leaf, destroying it by penetrating the cell wall and feeding upon the food prepared for the nourishment of the vine. When mature, the fruit of the mildew fungi is borne upon stalks that come out of the breathing pores of the leaves, and appear in such numbers as to give the leaf a mealy appearance, whence the name, *meal dew*, or *mildew*. It makes its appearance during wet weather, when the vine is in an unhealthy condition from any cause. It is doubtful if this fungus will grow upon perfectly healthy tissue.

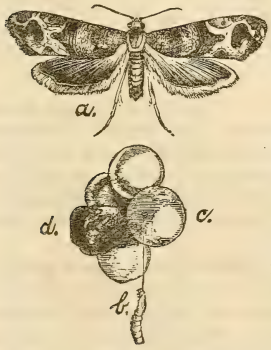


Fig. 68.

Remedy.—Good cultivation, plenty of sunlight and a liberal supply of potash and bone is the best remedy that can be applied.

GRAPE-BERRY MOTH (*Endermis botiana*) is destructive only when abundant. Fig. 68 shows the perfect insect at *a*, *c* the discolored spot where the worm has entered the fruit, *b* the worm, and *d* the berry it has deserted. There is no practical remedy, but burning the fallen leaves to destroy the chrysalides they harbor is recommended.

CHAPTER XVI.

THE BLACKBERRY AND RASPBERRY.

THEIR PROPAGATION—TRANSPLANTING — CULTURE — PRUNING—WINTER PROTECTION—VARIETIES—GATHERING—MARKETING—PROFITS.

THE BLACKBERRY (*Rubus villosus*) is a native fruit, and found in almost every section of the country. The fruit is noted for its medicinal qualities, and is a valuable addition to the late summer fruits. It is more largely grown in field culture on the thin soils of New Jersey than in any other section of the country, from whence it is shipped to the large cities, both North and South.

The Blackberry is very commonly planted in the fruit garden, in some out-of-the-way corner, where it is allowed to spread unmolested until it becomes an impenetrable jungle, where neither man nor animals can get at the fruit. Then we hear it voted a nuisance, when with a little care at the proper time it would have yielded an abundance of rich and healthful fruit.

PROPAGATION.—The Blackberry is naturally propagated by suckers from the roots, and for all ordinary purposes no other means need be employed. The number of suckers may be largely increased by running a sharp spade into the soil in the fall, eight or ten inches deep, near the plant, at intervals of every three or four inches. The roots thus cut off will throw up numerous shoots and result in independent plants.

The Blackberry is also propagated by *root cuttings*. In the fall the roots are dug up, using everything the size of one-eighth of an inch in diameter and upward, and cutting them into three or four inches in length. These are put in beds of rich soil and covered with two or three inches of soil. The bed should be protected from severe freezing by covering it with from ten inches to one foot of mulching material. In the spring this mulch is

taken off, and each piece of root will throw up one or more shoots and make good plants. Root cuttings are sometimes preserved in boxes of soil, buried in the ground during the winter, and planted in the bed in the spring, or in the field, where they are to grow permanently.

TRANSPLANTING.—The best time for setting out Blackberries and Red Raspberries is in the fall, although they may be set with success in the spring. If planted in the fall, a shovelful or two of soil or manure should be put around the plants to prevent their being thrown out by the frost. The Blackberry will grow upon very poor, thin soil, and upon such is not liable to winter-kill; but to obtain large fruit, the land must be heavily mulched during June and July to prevent the escape of moisture. When planted upon rich, moist land, in order to be certain of a good crop, the canes must be covered in the winter, as directed below.

The distance for planting the Blackberry is four by six feet for Wilson's Early and other small growing kinds, and four by eight feet if to be grown in rows, or six by eight feet if to be grown in hills, for the larger varieties. They are planted so as to run together, forming close rows, or may be kept in hills so that the work of cultivation may be done with the horse.

CULTIVATION AND PRUNING.—There are few crops that may be so easily grown, if the work is done at the proper time, as the Blackberry; and there are also few fruits, that if neglected, require so much care to put in condition again.

The *hill system* has many advantages, and among others, that the suckers, which will come up in large numbers, may be kept down entirely with the cultivator, going both ways, while in the *row system* they must be thinned out with the hoe and hook, and all suckers not wanted in the hill or row must be treated as weeds. If no mulch is used when the fruit is maturing, the cultivator should be run every few days to keep the soil loose and light, so as to prevent the escape of moisture. Late cultivation, that is, after August first, should be avoided, on account of its tending to cause a late growth of cane, that is very liable to winter-kill.

The best way to destroy suckers, if they have been neglected until too woody to be cut off with the hoe (and this is the condition of many blackberry plantations), is to put on a thick pair of gloves and an old coat, and pull them out in June or July. If pulled at this time, very few will start until the following spring.

PRUNING.—The success of Blackberry and Raspberry cultivation depends largely upon pruning. The first year, at planting, the one cane used should be cut back to six or eight inches. During the summer, when the new shoots have reached two feet in height, the ends must be pinched to make them stocky, so that they will not require support. At the end of the first season's growth the old cane should be cut out entirely. The second year the canes will bear some fruit, but probably not enough to pay to

protect by mulching, and it is better to pick the blossoms off, that the whole strength may go into the new canes.

The same process of *summer pruning* should be practiced, as the first year, to make the canes stocky, and only a limited number of the strongest canes should be allowed to grow in each row or hill. At the end of each season's growth the old canes are again cut out. This may be done during the fall, after the leaves have turned yellow; or, what is a better practice, in August or September, after the fruit has been gathered, so as to allow the new canes a better chance to develop. The third season from planting a full crop of fruit may be expected, and the process of pruning each year is the same as the first and second season. No supports are needed for the canes if they have been properly summer pruned.

WINTER PROTECTION.—It is doubtful if we have any varieties of this fruit that are perfectly hardy in this latitude. Many are claimed to be perfectly hardy or iron-clad, but in unfavorable seasons all are more or less injured by cold. For this reason some protection must be given, and laying down and covering with soil should be resorted to, to insure the crop. This will seem like a formidable undertaking to the inexperienced; yet it is very easily and quickly accomplished by three men, two of whom are provided with thick gloves and coat.

The men with gloves gather the plants of a hill or a part of the row in their hands about a foot from the ground, and with a strong pull start or loosen the plants at the roots a little, and then bend them over to the ground, all the time pulling the canes that they may not break. When bent to the ground, the third man, with a spade, throws soil enough upon the ends of the canes to keep them in place. When the whole field has been laid over in this manner, a plow is run upon each side, throwing up more soil and completely covering the tops.

Should the ground be covered with snow during the winter, complete covering will not be necessary, and the canes may be laid down and kept in place by heavy rails. Two men take the rail and place it against the canes of several hills near the ground, press firmly against it, and as the canes bend the rail is raised so that when bent over entirely it will be about midway of the canes. In this way but few of the larger canes will break, and it would be well to first go through the rows and loosen them at the roots before using the rails.

VARIETIES.

Wachusett.—This is a native of Massachusetts, and is as hardy as any variety, having been injured only a few seasons since its introduction. It is comparatively free from thorns, and is called the "Thornless." The fruit is of medium size and of fine quality. In rich soil the fruit is of good size.

Snyder.—A variety somewhat resembling the last in fruit, but a little larger, more vigorous and productive, but not quite as hardy.

Agawam.—Resembles the Snyder, but is earlier and perhaps a little larger; vigorous, hardy and productive.

Wilson's Early.—An old, tender variety of small growth, but producing very large early berries of good quality. As the canes are small, they may be easily laid down and treated in this way. This variety would probably be profitable.

Kittatinny.—A tender variety of very large growth, and producing very large fruit of fine quality when not winter-killed; must be covered.

New Varieties of Promise.—Wilson Jr., Early Harvest, Early Cluster.

Gathering and Marketing.—The Blackberry is picked in quart or pint strawberry baskets and shipped in the common crates. If gathered while yet hard, it will stand two days without injury, and, in fact, will improve a little in quality, but will not be as good as when gathered perfectly ripe from the vines. If picked in good condition, and if of good size, it sells readily in all markets at from ten to twenty cents per quart. It should be planted in every garden, for no plant will produce as much fruit with so little care, if given at the proper time.

CHAPTER XVII.

THE RASPBERRY.

The Red Raspberry (*Rubus strigosus*).—This is a fruit that always commands a very high price, and is being extensively grown in many sections. It requires a rather more moist soil than the blackberry to produce its best results.

It is propagated in the same way as the blackberry, and is best planted in the fall. The distance of planting may be a little less than for the blackberry, or about five by six feet for the hill system, and three by six feet when grown in rows. The pruning, training and covering are also the same as for the blackberry, although, being smaller in growth and having less prominent thorns, it is much more pleasant working among them.

As with the blackberry, large fruit must not be expected from the Red Raspberry, unless the land is made rich enough to produce a large growth of canes, although such a growth must be protected from injury during the winter, and an abundance of moisture must be provided at the time of ripening by mulching.

The fruit is very soft, and is generally shipped in pint or third-quart baskets. It is also very perishable, and must be handled quickly, or there is a loss to the grower or dealer.

Varieties.—Leaving out the older kinds, some of which are valuable under some conditions, but all very tender, I shall describe only those that are comparatively hardy; although, like the blackberry, none are perfectly hardy or iron-clad, and all are benefited by winter covering.

Turner.—One of the hardiest, most productive and earliest, but of rather small size and crumbles when picked. Under high cultivation it will prove valuable unless the two new early Raspberries, the Hansell and Marlboro, shall prove as early, hardy and productive.

Cuthbert.—A very large, rather late variety of large size; very vigorous and productive. It is the finest variety in cultivation, but its lateness is an objectionable feature.

Caroline.—A yellow variety, partaking something of the nature of both the Red and the Black-cap varieties in habit of growth. It is propagated both by suckers and by rooting of the tips. It is one of the finest in quality; vigorous, hardy and productive, but too soft for distant market. It should be in every garden.

Hansell.—A new early red kind, of medium size, fine color and good quality, but seems not to be very vigorous under ordinary cultivation.

Marlboro.—A large, vigorous-growing, new variety, and promises to be as good as the Cuthbert, and perhaps larger in size. The last two kinds require further test in northern sections to prove their hardiness.

Black-cap Raspberry (*Rubus occidentalis*).—This fruit, known in its wild state as the Thimbleberry, differs in its method of propagation, as well as in habits of growth and color of fruit, from the Red Raspberry. The fruit is less acid, black in color, and with, perhaps, seeds larger in the fruit in proportion to the pulp. It is propagated by *stolons*, that is, by the ends of the canes bending over and taking root. It throws no suckers from the roots, but grows in hills or stools. It requires a rather more moist, rich soil than either the Red Raspberry or the blackberry, and produces much larger crops of fruit. The time of ripening is just after strawberries, and before the Red Raspberry.

The distance of planting should be five by six feet, and cultivation is best done with the horse, running the cultivator both ways. It is best planted in the spring, and begins to produce paying crops the second or third year. The pruning required is the same as for the blackberry and Red Raspberry, but a second and even a third pinching is necessary to give plants a close, compact form, that will not need support. Many growers adhere to the old system of supporting with stakes, but if properly pruned no stakes are required. Sometimes the canes are broken down by the heavy snows of winter, and then the best support that can be used is a wire about three or four feet high, supported upon stakes twenty feet apart. This should not be put up until near the time of ripening of the fruit. A single strong string passed around each hill and tied to the wire is all the support required. After fruiting, the wire should be wound up and put away so that cultivation may take place both ways.

VARIETIES.

Souhegan.—This is one of the earliest and best. It is similar to the Doolittle, but possibly is a little earlier and larger, although the latter is still a standard sort, and is much increased in size by good cultivation.

Hopkins.—Resembles the Souhegan much, very early and productive.

Centennial.—A large, medium-early variety, very fine, sweet and productive; one of the best.

Mammoth Cluster.—A very large, late variety, covered with an abundance of bloom; of good quality, hardy and productive.

Gregg.—A late variety of large size, finer quality and with less bloom than the last; very productive but not as hardy as the other varieties described.

Yellow-cap.—This is an old variety, very common in old gardens; of fine quality, but the Caroline, described under Red Raspberries, is superior in quality, productiveness and hardiness.

Shaffers.—A cross between the Red and Black-cap Raspberry; fruit large, dark red and very acid; valuable for preserving; very vigorous and productive.

INSECTS.—Few insects are destructive to the Raspberry or blackberry. The Root-Borer (*Ægeria rubi*) Fig. 69, *a* being the male and *b* the female, is a small, wasp-like moth, resembling the peach-borer somewhat, but smaller. The eggs are laid during June and July, on the canes near the ground. The egg hatches, and the larva eats into the pith of the cane and passes down into the root. Here it continues feeding until the following spring, when it comes up through the center of another cane, where it undergoes its changes and comes out the perfect moth, as illustrated. The injured canes generally are destroyed early in the summer.

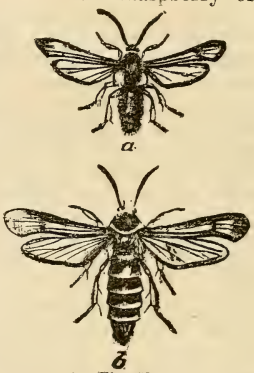


Fig. 69.

Remedy.—The presence of the Root-Borer is generally made known by the dying of the new canes early in the summer, and the remedy is to cut until the worm is found.

A few other insects are sometimes injurious to the Raspberry and blackberry, but not so much so as to warrant description in so limited a work as this.

CHAPTER XVIII.

CURRANT AND GOOSEBERRY.

The Red Currant (*Ribes rubrum*)—The cultivation and use of the Currant has increased rapidly in the past few years, and while in no way can it be compared with the grape or Strawberry in the large amount of fruit consumed, yet its refreshing acid makes it one of the most healthful summer fruits.

Propagation.—It is easily propagated by cuttings and layers. Cuttings are best made when the leaves begin to fade in August or September. They are made of the new wood, from six to eight inches in length, and should be planted at once, in a very rich, moist loam, as directed for grape cuttings and root-grafts; being sure to give the soil a firm pressure around the base. Before the ground freezes in the fall the bed should be covered with several inches of mulch to prevent the action of frost throwing them out. Cuttings may also be made in the spring, but they do not root so readily nor make as strong plants as when planted in the fall. At one or two years they are ready to be planted in the field.

The best soil for the growth of large fruit is a deep, rich, moist loam, but well underdrained. The best distance for planting is four by six feet. This will allow of the use of the horse in cultivation, both ways, the two or three first seasons. Any hoed crop may be planted between the rows, one way, the first season. At from two to three years from planting, fruit is produced in moderately paying quantities,and with good cultivation the bushes may be expected to produce good crops for twenty-five years. By good cultivation, I mean the annual application of from five to ten cords of good stable manure per acre, or its equivalent of bone and potash, and the destruction of weeds and grass before they can do any harm.

Pruning and Training.—The Currant is trained in both the bush and the tree form, but the former is the best, except for ornamental gardens, as it is the most natural method of growth, and requires the least labor.

The fruit is borne upon short spurs on the wood after the second year's growth. Young wood always produces the best fruit. All the pruning required is to cut out the old wood when it becomes weak and covered with moss and fruit buds but produces little foliage.

Gathering and Marketing.—Unlike the strawberry and other small fruit, the Currant may be allowed to remain upon the bushes for several weeks after it is ripe, but it does not ship quite as well when overripe as when first thoroughly colored. It is commonly picked in the ordinary strawberry basket, and shipped in crates holding thirty-two or sixty quart boxes or baskets. Care should be taken to pick the fruit with the stems, for if the berry is pulled off the stems the skin is broken, and it soon decays.

The price obtained for good fruit ranges from five to fifteen cents per quart at retail, and it is a profitable crop at these prices.

Varieties.—While there are many distinct varieties of the Currant, the great value of any and all kinds is determined by the cultivation given. All varieties may be made large and showy if the methods of cultivation just described are closely followed. The claim of Fuller and others "that the differences in the red varieties are wholly due to cultivation," is, I think, incorrect.

Cherry.—This variety is stocky and vigorous in growth, with a short bunch and a large acid berry.

La Versaillaise.—Bush more straggling and larger than the last; bunch longer, berry not quite as large, but of better quality.

Victoria.—Resembles the last in form of branch, but is more acid and valuable for its lateness.

Fay's Prolific.—This is a new variety, resembling the Cherry, but claimed to be more productive. Its only merit, if it has any above the older varieties, is in its productiveness.

Red Dutch.—An old variety, very productive, and fruit of fine quality. Under good cultivation it becomes of good size, and is profitable.

White Grape.—The white currants are less acid and of better quality than the red kinds, but not as valuable. This is one of the best varieties in quality and size.

White Dutch.—Resembles the Red Dutch in habit of growth and fruit; very productive.

Black (Ribes nigra).—In some sections this fruit finds ready sale. Its immense productiveness would make it very profitable if there was a demand for the fruit. There is a very promising

field for experiment in this line in the production of new varieties. If a variety equally productive, of an improved quality, can be produced by hybridization or otherwise, the originator can make considerable money out of it.

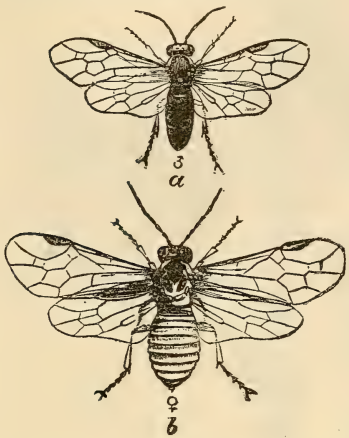


Fig. 70.

Insects. — The *Currant Worm* (*Nematus ventricosus*) is shown in Fig. 70, *a* being the male, and *b* the female, both enlarged to twice their natural size. This is the most destructive insect that attacks the Currant. The female lays its eggs upon the veins of the under side of leaf (as shown in Fig. 71). Soon after they unfold the larvæ, which hatch in a few days, and are illustrated at Fig. 72, feed rapidly, often denuding the bushes in a short time, and, soon maturing, make a cocoon, either upon dry substance near, or in the ground. In the latter part of June the fly (Fig. 70, *b*,) escapes from the cocoon and lays more eggs, which hatch out, and the second brood appears just as the fruit is beginning to ripen, and often strips the vines of leaves in a few days, leaving the half-ripened fruit only.

Remedy.—The best and safest remedy is Pyrethrum powder, applied just at night. It is a sure remedy, and is harmless, while hellebore, so often recommended, although nearly as effective, is very poisonous, and cannot be used with safety when the fruit is ripening. Planting a few Houghton Seedling gooseberry bushes among the currants will aid in the destruction of the worms, as they have a great liking for the tender leaves of this gooseberry, and the first brood will be found almost entirely upon them. A few other insects are injurious to the Currant and gooseberry, but none that seriously endanger the crop.

Fig. 71.

Imported Currant Borer (*Ægeria tipuliformis*) burrows in the interior of the stems, so weakening them that they cannot sustain the weight of the fruit. Fig. 73 shows the female moth,

and *b*, Fig. 74, the larva which hatches from its eggs and does the mischief; *a*, Fig. 74, is the chrysalis. Cutting out and burning

Fig. 72.

Fig. 73.

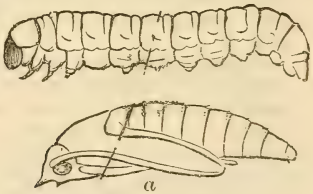


Fig. 74.

all stems that by their sickly appearance indicate the borer's presence is the only remedy.

THE GOOSEBERRY.

American Gooseberry (*Ribes hirtellum*). European Gooseberry (*Ribes grossularia*).

In methods of cultivation and propagation the treatment of the Gooseberry is the same as above outlined for the currant. The Gooseberry is not a fruit that finds a ready sale in large quantities in our markets, but is desirable for the home garden. Among the best native are :

Downing.—This is a round, greenish-white berry of medium large size, with a thin skin ; very productive, vigorous, and of good quality.

Smith's Improved.—A medium to large yellow berry, with a thicker skin than the last, and of rather better quality; bush not quite as vigorous, but productive.

Among the best of the English varieties are :

Red.	Yellow.
Crown Bob,	Whitesmith,
Ashton,	Sulphur Yellow.
Ironmonger.	Industry.

CHAPTER XIX.

THE STRAWBERRY.

IMPORTANCE—SPECIES—PROPAGATION—SOIL—TIME OF PLANTING—METHODS—THE HILL SYSTEM—MATTED ROW CULTURE—MANURING—WINTER PROTECTION—CULTURE—VARIETIES—GATHERING AND MARKETING—INSECTS AND DISEASES—CROSS FERTILIZATION.

The Strawberry is pre-eminently a home fruit. Its early ripening, ease of cultivation, quick returns and large yield per acre, make it one of the most important fruits. It succeeds at the far South and the cold North, as far as any of the common crops can be cultivated, and being readily shipped a long distance, it may be found in our markets from February to August.

The varieties now under cultivation have originated from several species of the genus *Fragaria*. *Fragaria vesca* is the European; F. *Virginiana*, the common American, and *F. grandiflora*, the South American Strawberry. These species have become so crossed, intermixed and improved by cultivation, that the typical form of either is seldom seen in cultivated varieties.

PROPAGATION.—The Strawberry naturally propagates itself rapidly by runners, and in case of new or scarce varieties it is sometimes propagated by division of the crowns.

SOIL.—Although it succeeds in a great variety of soils, that best adapted to the production of fruit is a medium, deep, sandy loam, that is not affected by drouth. Upon a heavy, moist soil, the plants tend to run too much to vines and produce little fruit; while in a light soil, more fruit is generally set than the plants can mature, and consequently little or none of it is as good as it should be.

The most perfect condition for the growth of this fruit is a light soil, with facilities for an abundant supply of water during the ripening period and whenever a period of drouth may occur. These conditions, however, are difficult to obtain. For general purposes a more moist soil should be selected, using fertilizers containing those elements that tend to increase the amount and

quality of fruit—potash and phosphoric acid—instead of the nitrogenous kinds like stable manure, which tend to the large development of leaf at the expense of the fruit. It must be borne in mind, however, that large and perfect fruit cannot be produced without a large development of perfect foliage; and the grower must use good judgment in the application of fertilizing material according to his soil. Fine ground bone and potash will be found the best fertilizer that can be used under general conditions, adding more nitrogen if the soil be very poor; or only applying potash if the soil is already very rich in nitrogen.

TIME OF PLANTING.—The best time for planting is in the spring. August planting is not to be recommended, unless one has time to do the work more thoroughly than in the spring. Fall set plants seldom make growth enough to give paying crops the first season, and the plants start in the spring in a hard and often weedy soil that is difficult to keep clean. When planted in the spring the soil is light, loose and free from weeds, and the plants make a strong, rapid growth, that will give the best crop that can possibly be produced the following season.

The best growers, who raise fruit for profit, never set their plants in the fall, and the small cultivator can hardly expect to improve upon their methods. It sometimes is advisable, when one has no Strawberry bed in the garden, and is desirous of having fruit at the earliest possible moment, to plant as early in August as is possible, potted plants or well rotted layers with soil upon the roots; but if the cost is reckoned against the value of the fruit produced, it will be found a losing rather than a paying operation. I would say, however, set Strawberry plants in August or even later, rather than have no Strawberry bed in the home garden.

METHODS OF PLANTING.—Of the many methods or systems of planting and cultivation, I will mention only a very few that are most generally in use. In the

Hill System, the plants are set in rows two and one-half to three feet apart, and one foot apart in the row, and all the runners are kept cut, so that at the end of the season large stools are produced, the leaves of which touch together and only a space of about one foot is left between the rows. This requires a large number of plants—from twelve thousand to fifteen thousand per acre—and much more care in cultivation, but the fruit is very large and of fine quality, and brings the highest price.

A modified form of this system is to plant two and one-half by three feet, and during the early part of the season cultivate both ways with the horse. When the runners begin to grow vigorously, the strongest are trained into the spaces across the widest way, filling up so that they stand about one by three feet apart, when all other runners are destroyed. In this way, between five and six thousand plants are sufficient to set an acre, while the results are perhaps equally satisfactory as by the full hill system.

The *Matted Row System* consists in planting in rows three and one-half or four feet apart, and two feet in the rows. Cultivation with the horse is done but one way and the plants are allowed to run in beds covering the ground all but about a foot space between the rows. By this method wonderful crops are sometimes reported, and the labor the earlier part of the season is comparatively light; but when the plants cover nearly the entire ground it is slow work getting out the weeds from among the plants without injury.

This system is modified by allowing the runners to take root at intervals of six to ten inches over the bed, more or less regularly, and then destroying all other runners. By this means nearly the same result is obtained as by the modified hill system.

The advantage of the horse cultivator or hoe over the hand-hoe for destroying the weeds in the early part of the season, has led to the method of planting four by four feet. This requires less than three thousand plants to the acre. The cultivator is run both ways until the runners interfere. Then the rows or beds are filled up one way by transplanting the plants into the vacant space, setting them from six to ten inches apart, thus making a modified matted row. This is one of the best methods that can be practiced.

For the home garden, the plants may be grown by any of the above systems, but if to be grown in hills, and the work of cultivation is to be done by the hand-hoe, they may be planted more closely. The only conditions that are necessary in the garden culture is to give the plants the proper amount of room, and have them arranged so that the fruit may be gathered conveniently. Of course an abundance of proper plant food must be supplied.

Under whatever system the Strawberry may be grown, the plants must have an abundance of room and food to produce strong and well matured crowns, which are essential to the production of large and abundant fruit. The land must be kept free from weeds during the entire season, but as little stirring of the soil should be done after September first as possible.

Winter Protection.—When the ground is not covered with snow during the winter, the plants must be protected from the alternations of freezing and thawing. This is done by covering lightly with a litter that is free from weed seeds. The covering should not be put on until the ground freezes, unless there is danger of the plants being covered up with snow, in which case it should either be put on or held in readiness so that it may be put on at short notice when the ground may be uncovered during the winter. The lighter or thinner the covering the better, provided it afford shade to the plants. Among the materials most used for this purpose are meadow hay or sedge grass, salt marsh hay, forest leaves, pine needles, fine brush, pine boughs, etc.

In the spring this covering must be drawn from over the crowns of the plants and be trodden in between the rows, thus

affording protection to the fruit from dirt and serving as a mulch to prevent the escape of moisture while the fruit is ripening.

After the fruit has been gathered, if the bed is very weedy the plants, together with the mulch, may be plowed under and a crop of late cabbage or turnips planted. If the Strawberry plot is comparatively free from weeds, the bed may be cleared up with profit for fruiting again, by first running the mowing machine over it, and then raking up the cut tops and as much of the mulch as possible with the horse-rake. The plow is then run between the rows, leaving a row of plants eight or ten inches wide. The plow is to be followed with the harrow or cultivator lengthwise and then all weeds are hoed out between the plants. A bed treated in this way will often yield nearly as many quarts the second season as the first, but the fruit will be smaller and often of inferior quality. Should the growth of the plants show the need of it, a dressing of stable manure or fertilizer should be applied upon the plants in the fall.

VARIETIES.—The varieties of Strawberries may be divided into two classes according to the flowers: The pistillate, which must be planted near other kinds producing an abundance of stamens; and the perfect flowered kinds, that produce both stamens and pistils. The former are often more productive than the latter.

Among the sorts most valuable for market and also for home consumption, in order of ripening are:

Crescent.—This is a very early pistillate variety, vigorous, and one of the most productive. In quality it is rather poor, but its fine color and perfect form make it a very attractive variety in the market. It easily takes the place of the old Wilson. It must be planted with some perfect flowering kind. Every fifth or even tenth row, set with plants of the Miner's or Downing varieties will be sufficient to fertilize the Crescent.

Miner's.—This is a very hardy, vigorous, perfect flowered variety, the fruit of which somewhat resembles the Downing; but it is more productive, vigorous and nearly equal in quality. The fruit is large and ripens soon after the Crescent.

Sharpless.—This variety, so well known on account of its large and irregular-shaped berry, is proving a profitable market and home berry under good cultivation and in a light soil. The fruit is sweet, but lacking the lively acid so desirable in a fruit at this season of the year. The flowers are perfect, and it may be used to fertilize the Manchester, but does not blossom early enough to fertilize the first flowers of the Crescent.

Manchester.—This is a late pistillate variety of fine form, good color and quality, and very productive. It must be fertilized with some perfect flowered kind, like the Sharpless.

The four above mentioned varieties are more generally proving valuable than any other kinds. The Downing, which has been very popular, and is still grown in many sections, is superceded by Miner's for market.

ADDITIONAL VARIETIES OF MERIT.—Hervey Davis, Bidwell, Golden Defiance, Jersey Queen, Jumbo.

NEW VARIETIES.—Jewell, May King, Henderson, Parry, Mrs. Garfield, Prince of Berries.

GATHERING AND SHIPPING.—In this latitude picking generally begins from the tenth to the fifteenth of June. Sometimes it begins a few days earlier and lasts from the first to the fifteenth of July. The introduction of the Crescent and Manchester has lengthened the season for profitable market berries nearly one week.

In the field the berries are generally picked by women and children, the average price paid for picking being about two cents per box. When the crop is not large and an abundance of good pickers can be obtained, it is often best to hire the pickers by the day. The work will always be done better, and the care and strain of looking after a lot of unruly boys is avoided.

The basket generally used is the square chip basket. It should be made of smooth material, with openings not over one-fourth of an inch between the parts and less is better. If the openings are large, the berries are pressed against the edges and injured. A square box made of two pieces with a cover, called the "Sunnyside basket," is very useful for retailing the fruit in, but is not as durable and not convenient to take to the field for picking. The crates most commonly used for shipping hold thirty-two of the quart boxes, fitting so closely as not to be moved about in handling. The sixty-quart crate is fast going out of use.

Several methods of recording the number of baskets of berries picked by each picker are in vogue, but perhaps the best is to give each one a tray holding six baskets, which when full he carries to the packing shed and gets credit for his work. One person is required in the field for every twenty pickers to see that they pick clean and well, and another man at the packing stand to keep the record and pack the fruit. It is well, in order to know whether all the pickers are doing good work, to turn an occasional box into an empty one. In this way, any attempt to cheat, by putting poor berries into the bottom of the box, is soon detected.

The berries are picked every day and it is best to have pickers enough to have the day's picking gathered early in the morning or late in the afternoon, according as it may accommodate the trains or other means of transportation employed and the markets to which they are to be shipped. Picked in the cooler part of the day, unless it is wet, the fruit reaches the market in a much better condition than if picked in the hot sun.

The best market is generally the local one unless over-stocked, or some near market a little further north. The time is passed for fancy prices for the first native fruit in northern markets, owing to the introduction of southern fruit; yet the first natives always bring a much higher price than the imported southern

berries, and the greatest profit is obtained from the early kinds. Late kinds are not as profitable for it is very difficult to get the price up very much for late berries, when it has once reached a low point.

INSECTS.—Only a few insects are destructive to the Strawberry. Perhaps the most injurious is the larvæ of the

June Bug or *May Beetle* (*Lachnosterna fusca*).—This beetle lays its eggs only in soil that contains grass or other roots for its young to feed upon in May. The larva, the common large white worm, always found in turf land, feeds two or three years in the soil before it changes to the perfect state. In land that has not been cultivated more than one year, these worms remain, and as the roots of the grasses are destroyed in plowing, they have nothing to feed upon but the roots of such plants as may be grown. If these plants be those of the Strawberry, of which the worms seem particularly fond, many plants will be destroyed and others very much injured.

Remedy.—The only certain remedy that can be given is to plant only upon land that has been cultivated at least two years with some other crop.

The Root Borer (*Anarsia lineatella.*) The moth (Fig. 75) lays its egg in the crown of the plant in midsummer, hatching in a short time, and burrowing into the root remains there during the winter, causing the plant's death by injuring the roots. Pulling and burning the plants is the only remedy. The worm sometimes bores in peach twigs, as shown in the lower figure in the illustration.

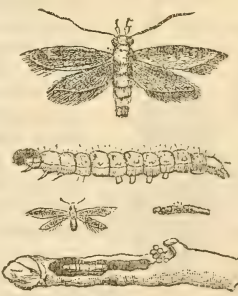


Fig. 75.

The Crown Borer (*Tyloderma fragariæ.*—Fig. 76, *a*, the larva that does the boring; *b*, side view, and *c*, back view of the beetle that lays the egg, all much enlarged; destroys plants by boring into the crowns. Pulling and burning immediately after the fruit harvest, and before the perfect beetle comes out, is the only remedy, and it is not effective.

There are a few other insects that at times do some harm to the Strawberry plants or fruit, but none of sufficient importance to be described here.

DISEASES.—The Strawberry, under favorable conditions, is seldom affected by disease. When the plants have become weakened by some cause, as over-bearing, want of food or poor cultivation, a fungus attacks the leaves and often destroys them. It first appears as a few round spots upon the leaf; these increase until the leaf is nearly covered with them, when it turns brown and dries up.

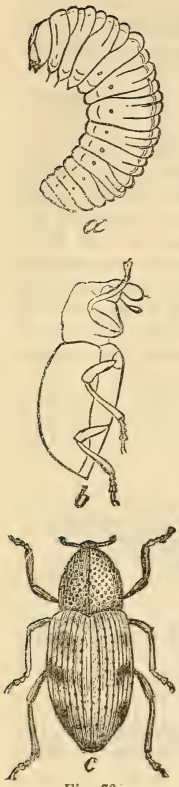


Fig 76.

The Remedy, like that for all fungus diseases attacking plants or animals, is to keep the plants in good condition by the use of an abundance of proper plant food.

CROSS FERTILIZATION.—This is a subject that has caused some discussion among leading horticulturists. It is claimed by some that the quality of the fruit of pistillate varieties is changed or modified by the kind of pollen used to fertilize the blossoms; that if the pollen of a very acid berry be used, the fruit will be more acid than if the pollen of a sweeter berry was employed. While this theory has the sanction of some prominent horticulturists, I cannot but feel that it is not founded upon any positive knowledge of the claimants, and is unreasonable in the light of our present knowledge of plant growth.

In no instance where two varieties or species are crossed, as far as my knowledge goes, does the change thus caused in the individual ovary affect the receptacle upon which it is borne. The true fruit of the Strawberry is what are called the seeds, which are simply numerous individual ovaries situated upon the fleshy receptacle—the edible part of the fruit. These little ovaries are fertilized by minute pollen grains, perhaps not over one-four-hundredth of an inch in diameter, which fall upon the stigmas and seeds down pollen tubes perhaps not one-tenth of the mass of the grain. The contents of the end of this tube, possibly not more than one-four-thousandth of an inch in diameter, unites with a minute cell, perhaps not much larger. The result is a vitalized cell, in which is centered all the forces that make the plant resulting from it unlike other plants that come from other seeds upon the same receptacle. This vitalized cell simply receives the crude sap or food furnished it by the root, stem and leaf, and transforms this food into starch, sugar and other substances for the nourishment of its own structure, the embryo.

The present knowledge of the laws of plant life leads me to believe that the ovary is nourished by the cellular structure of the other parts of the plant, and it does not furnish any material that can in any way modify the composition of even so nearly related a part as the receptacle upon which it grows.

When it can be proved that the composition of the cob is changed when different varieties of corn mix, then we shall have reason to believe that the receptacle of the Strawberry can be changed under like circumstances.

CHAPTER XX.

THE FRUIT GARDEN.

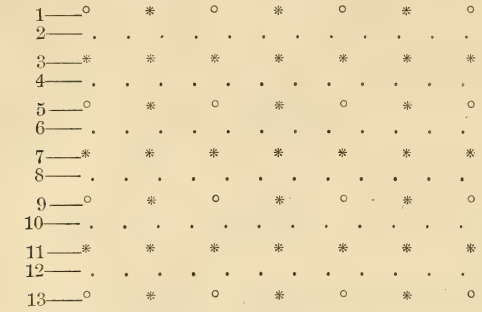
The fruit garden is a necessity to comfortable existence in the country. The average farmer's fruit garden consists of a few apple trees distributed about the farm; a few neglected pear, peach and plum trees in various places about the buildings; a cherry tree or two in the front yard of the house; currant bushes and perhaps a few raspberries and blackberries over-run with grass and weeds along a wall or in some fence corner; and a strawberry bed so choked with grass and weeds that fruit is very small and difficult to find.

So much of enjoyment and healthful food can be produced from a small piece of land, that no home should be without a well organized fruit garden, and the best land of the farm is none too good.

The location should be near the house where it can receive attention at odd moments, and away from obstructions, like walls and fences, so that the work of cultivation may be done largely with the horse.

In the planting of a fruit garden it is of almost as much importance to have a plan to go by, as in building a house or barn. It is surprising how much, and what a great variety, may be grown on a small area when properly arranged. To illustrate, let us take a plot 100 by 100 feet, or nearly one-fourth of an acre. Plant four rows of apple trees of four trees each, thirty-three and one-third feet apart, making sixteen in all; between the trees in the apple rows may be planted twelve pear trees, almost seventeen feet apart; between these rows may be planted seven trees each of peach, plum and cherry, a little more than sixteen and one-half feet apart. Now between these rows of trees may be planted grapes, currants, raspberries and blackberries, over eight feet apart, leaving two spaces over sixteen feet

wide for strawberries, and eight spaces over eight feet apart and the spaces between the trees and small fruits for planting with vegetables. We here present a diagram of the plan:



1—Apple and Pear.
2—Grape.
3—Peach.
4—Currant.
5—Apple and Pear.
6—Raspberries.
7—Plum.
8—Blackberries.
9—Apple and Pear.
10—Strawberries, etc.
11—Cherries.
12—Strawberries.
13—Apple and Pear.

This may seem to many to be a much larger crop than any but the very best of land can support, but the farmer and gardener, to be successful, must use his land only as a place in which to manufacture his crops, as the manufacturer does his factory, and if the raw material is not already in the soil (his factory), he must go to market and buy it. It will be found, however, that on most soils the addition of the fertilizing material necessary to grow the vegetables that can be planted on the land, will be sufficient to enable the trees to make all the growth they ought to make until they begin to bear fruit. To insure a healthy and fruit-producing growth of fruit trees and small fruits, wood ashes, ground bone, potash and the phosphates should be used.

If it is thought best not to plant the full amount at once, the larger trees may be planted, and one or two plants of each of the small fruits, from which, with a little care and skill, plants enough may be propagated in a year or two to complete the plantation.

APPENDIX.

FRUITS FOR THE COLD NORTH.

T. H. HOSKINS, M. D., IN RURAL NEW YORKER, AUGUST 1, 1885.

The winter of 1884–85 was the coldest known in Northern New England for at least a quarter of a century. The thermometer went lower, stayed low longer, and went low oftener than in other cold winters, and all these things conjoined to produce a maximum of ill effects upon our fruit trees. In addition, the snow was slow in coming, the ground not being permanently covered until near Christmas, so that unmulched trees suffered more or less from root-killing. The only thing lacking to make it the worst of all possible winters for orchardists was a violent alternation of temperatures. The winter was unbrokenly cold.

Such a winter is by no means an unmixed evil. For the experimental tree grower it was a genuine test winter, enabling him to form a correct judgment as to the hardiness of his trees. With between one and two hundred species and varieties in my grounds, I am able to report results which will be useful to many readers along our northern border and in the Dominion.

The most prominent fact demonstrated is the general worthlessness, "in the cold North," of all tree fruits of Western Europe. Apples, pears, plums and cherries were alike destroyed or crippled; hardly one, even of those of Canada, escaped. Nevertheless, the efforts of our Canadian neighbors have not been without their value, for their seedlings and selections give us the hardiest of the West European stock. That there is a vast difference among them in hardiness, all with experience in growing

them will allow, though I believe Prof. Budd does not think there are any strictly "iron-clad" sorts among them. Some of the Northeast European varieties have been in this country for half a century, and it may be that among the hardiest sorts of New England few, if any, are free from admixture with this strain or race, or with the Siberian species, which has been still longer in America, and is, in some of its varieties, to be found in almost every orchard. The Siberian is quite as different in all its leading characteristics from the Russian, as it is from the English and French apples, while the North German, Swedish and Polish tree fruits seem to be intermediate between those of Southwest Europe and those of Russia.

Of all the apples in Northern New England but one came through last winter unscathed. This is the Foundling, a native of Groton, Massachusetts. My trees came from Canada under the name of Late Strawberry of Montreal, which the Montreal horticultural society has decided to be the Foundling. The only perfectly iron-clad Canadian apple is Pearl of Montreal—not a native, but imported from France, and believed by Prof. Budd to be a true Russian. It is a very productive, beautiful and delicious September dessert apple, but must be ripened on the tree to develop its quality, and is then far too soft for shipment, being defaced by even the most gentle handling. The hardiest native Canadian apple I have is the St. Lawrence, which seems to be nearly as hardy as Wealthy; but it is a very poor bearer here, even on trees seventeen years planted, though on the island of Montreal it is quite productive. The Fameuse is slightly less hardy than the St. Lawrence, and the McIntosh Red is certainly no hardier than the Fameuse, yet none of those were fatally injured or worse hurt than the Baldwin often is in Maine and Massachusetts. Ben Davis and Clyde Beauty, apples of New York origin, and the hardiest I have tested from that state, were destroyed, as was the excellent New York crab-hybrid VanWyck Sweet. Of Maine apples, Cole's Quince and Rockwood are the hardiest I have tried, and were not hurt much more than the Fameuse. Of the natives of Southern and Western Vermont, Bottle Greening, Northern Sweet and Tinmouth failed to stand the cold, as did also Granite Beauty of New Hampshire. The only native apple of Vermont, outside of this (Orleans) county, that proves strictly iron-clad is the Bethel. It is a pity that this fine apple, fully equal to the Baldwin in every other point, is a shy bearer, especially when young. At a size when Wealthy yields a barrel per tree, the Bethel gives scarcely a dozen. Of our Orleans county seedlings the most valuable are Scott's Winter and Newport Winter Sweet, Magog Red Streak being superseded by the Wealthy. Newport Winter Sweet is a thorough iron-clad, equal in all respects to Tolman's (which is not iron-clad) and much better for eating uncooked.

Of Western apples, I can report well of Iowa Russet, a fine apple

received some ten years since from Prof. Budd, and the only Russet that passed through last winter unharmed. From Southern Minnesota, Giant Swaar and Rollin's Pippin (received from A. W. Sise, of Rochester, Minn.) seem uninjured. The Giant Swaar is a very valuable apple—as good, I think, in every way among the yellow apples as Wealthy is among the reds. I am much pleased with it. The Wealthy was not in every case unharmed, though only a few were hurt, and these were trees which had previously been hurt in the trunk by "sun bark blight," *i. e.*, injury from the strong action of the sun on the southwestern side. The large majority of my Wealthys are uninjured and bearing a good crop for the off year. Wolf River, from Wisconsin, shows itself, much to my surprise, to be vulnerable, though not seriously harmed.

And now for the Russians, which must, I am sure, be the best, if not the only reliance for the severest spots. We ought never to have placed the Red Astrachan among these. Its hardiness is below that of Fameuse, and about equal to that of Tolman's Sweet, Blue Pearmain and Westfield Seek-no-Further. None of these die, but all are practically worthless here. Astrachan is only politically a part of Russia, with a climate like that of Southern New York. There is no other among the more than fifty Russian apples I have tested that shows any defect in hardiness except Alexander, which is much hardier than Astrachan, though not ranking with Fameuse. Nevertheless, I have no doubt that degrees of hardiness under extreme exposure will be found among the Russians, perhaps even here, but certainly in Dakota, Minnesota, Northern Wisconsin and Michigan, Manitoba and Canada. But for my location, the question of hardiness is eliminated from the consideration, and we are left merely to select our sorts among the Russians on other considerations. The best so far in my orchard, in order of season, are Yellow Transparent, Tetofsky, Duchess of Oldenburg, St. Peter, Prolific Sweeting and Golden White. These are all summer and fall kinds. It is not yet time to determine in regard to winter kinds, as we have not had them long enough to judge them certainly. Those I have in bearing, Borsdorf and Little Seedling, though good keepers, are too small.

The later importations, Antonovka, Titovka (suppose we call them Antony and Titus), Arabka, Bogdanoff, the Winter Aports and Anises, and the Longfield, are all apples of good size and quality, and from them and others of the same season, there is no doubt that good selections can be made, which will succeed in all parts of America likely to be inhabited by white men.

As regards other tree fruits, last winter wiped out all pears except the small Russians from Budd and Gibb; all cherries except Lieb, Large Montmorency and Minnesota Ostheim Seedling of Mr. Myers; all plums except Arctic (injured), and the blue and yellow Orleans of Canada, and the Eastern and Western natives,

and my only Russian, "Arab," from Prof. Budd. It is evidently of no use for us to bother longer with any of the tree fruits of Western Europe. The work already done by the Iowa agricultural college, through Prof. Budd, in bringing over the hardy tree fruits of Northwestern Europe, propagating and distributing them, is a full return for all the money expended in establishing agricultural colleges in this country

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AGRICULTURAL CHEMICALS.

Muriate Potash, Sulphate Potash, German Potash Salts,
Kainit, Sulphate Ammonia, Nitrate Soda,
Dried Blood, Fine Ground Bone, Dissolved Boneblack,
Boneblack, Sulphuric Acid.

Descriptive pamphlets and circulars will be mailed free to any address, on application. Do not fail to communicate with us before ordering your supply of fertilizers or agricultural chemicals for Fall or Spring use.

BOWKER FERTILIZER COMPANY,

43 Chatham Street, Boston, Mass.
27 & 29 Beaver Street, New York.

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