

when night-frosts have ceased, and the soil has become warm and dry, a shady place is selected, soil suitable for the striking of cuttings prepared, and the young vines are transplanted into the open ground, about a foot apart, care being taken not to set them too deep; three inches will be sufficient.

It is well to mulch them at once, to secure an even temperature and moisture for their tender roots. Straw or leaves are the best material for that purpose. If properly attended, they will make a growth of from six to eight feet, sometimes as much as twelve feet, the same season, and will bear the second year after transplanting. They may remain during winter in their bed or nursery, and be transplanted at once the next spring in the vineyard. This method applies to all young plants grown in the propagating house, green-house, or hot-bed. The best earth to strike eyes in is a mixture of equal parts of well-rotten turf, or sod, soil, or leaf-mold, from the forest, and washed sand, with a little addition of fine bone and charcoal dust.

Propagation from seed.—The best ripened bunches should be selected, the seeds extracted, and dried in a shady, airy place. When dry, they should be put in a little bag, and hung up till wanted. A spot for a seed-bed should be selected on a dry, airy, and shady piece of ground, prepared as for cuttings, or eyes. The fall is the best time to sow the seed. Furrows, half an inch deep and one foot apart, are made, the seed dropped in, about two inches from each other, covered with washed sand, and finally with straw or leaves. In the spring, when the night-frosts have ceased, this cover is removed, and pine or hemlock boughs put on instead till the seed has sprouted, and young shoots make their appearance. Nothing else is required through the summer except weeding, and occasional watering at night in dry weather. Late in the fall the young vines are taken up with a garden-fork, and heeled in again. In the spring they are cut back to one eye, and replanted a foot apart, in which situation they remain undisturbed during the season.

But, as the grape-vine seldom reproduces its character in its offspring from seed, and is rather changed to all possible variations, there can be no confidence that such seedlings will be of the same type; sometimes they will be of a first-rate quality, and generally of different colors. The well-known and highly-esteemed Concord grape, for instance, is of a dark blue color; yet from this Mr. Bull has raised a white seedling of superior quality, and other seedlings of first-rate qualities, varying in color from a light Amber of all shades to a dark Traminer, while several, again, presented the same color as the original vine. Among seedlings, also, are male plants, which will not produce fruit at all. These are distinguished by their small, long eyes, lying flat on the wood, while fruit-eyes may be recognized by their short, thick, shouldered appearance. In order to find out what may be expected from them, they should be closely examined the second year, and those which promise best brought in a bending situation, to induce the formation of fruit-buds. They are taken up in the fall and planted in pots holding about six quarts, and their shoots cut back to three eyes. Until the middle of February they are kept in a cool place, when they should be put under glass, either in a green-house or hot-

bed, to be started. By bending the cane till the young shoots are out one inch, and cutting a ring from the bark below the upper eye, they will sometimes bear that season and show their true character. If there is no such convenience as a green-house or hot-bed, the propagator can only wait till the weather becomes warm, and in the meantime may place them in a sunny, sheltered corner, near the buildings. Of course, no fruit can be expected that season.

If, in either case, no fruit appear, the canes should be bent as soon as the wood begins to ripen on the lower part, and kept in this position till fall, when they are pruned back to six eyes. In the following spring this cane is bent again, and fastened on a stick, to remain so during the season. All the side shoots and new wood, except a leading cane, is pruned off during the summer, and only a single bunch allowed to grow. Seedlings which have satisfactorily fruited and proved of a generally good character, may be set out and grown as the sources of further propagation; they are now new varieties. Those in the seed-bed, or nursery, should be examined again, and such as compare well with the fruited specimens may be planted out in the vineyard; the rest, which show less good points, should be grafted, or budded, at once.

The object of taking up and transplanting these young propagated grape-vines every season is to get a chance to regulate their formation of roots, to cut back single leading roots and make them grow more fibres, which are less important to the rapid and vigorous growth of wood than to the fruit and its quality.

IMPROVING THE GRAPE-VINE, BY LAYERING, GRAFTING, BUDDING, AND HYBRIDIZING.

Improving by layering.—This, in the beginning, is performed as before described. After the plants obtained from layering off have been transplanted and grown one year, they are cut back in the fall to four eyes, and the next spring layered down again, and treated in the manner above referred to. In the fall they are taken up, heeled in through the winter, and set out again in the spring, being pruned back to one eye; the following fall they are cut back to six eyes, and layered down once more the next spring.

When this operation has been performed several times, the character of such a vine will be greatly changed, and the quality of its fruit improved. By this manipulation, another system of roots is obtained, the wild nature of the vine tamed, and, in consequence of its fine cellular texture, it will form larger fruit buds, the cluster will be heavier and more compact, the stem of the berry more tender, and, acquiring more and stronger fibres on the basis, the berries will not again drop off, the skin will become thin, and the pulp soft, juicy, and more sugary.

This method has been practised for centuries in parts of Germany and France, with the exception only that such plants were allowed to

grow and bear several years before they were layered again. All those first-class varieties, the Gutedel, or Chasselas, Muscats, Traminer, Malvasier, Riesling, &c., have thus been brought to their present high state of perfection.

Improving by grafting.—Grape-vines which have good roots, growing on houses, arbors, or such places, where stirring and breaking the surface-soil is omitted, and yet better fruit, or a different variety, desired, and where, also, shade is an object, may be successively changed by grafting on seedlings and other vines of inferior quality, to turn them to better account in the quickest possible time. This operation is best performed in the spring, when the buds have developed to two leaves, and when the sap does not circulate and flow so rapidly. However, the grafts have to be cut in the fall, when the vine is in a dormant state, and either buried in the ground, or kept in a dry, cool cellar, through the winter.

Grafting is performed in the following manner: The soil is removed about four inches deep, the vine sawed off, and the cut nicely pared with a sharp knife, a cleft is now made, two or three inches deep, into the stump or stock, which is kept open by a wedge till the graft is set; the graft should have two or three eyes, and be cut exactly to fit the cleft. The lower eye should be close to the bark of the stump, and the bark of both stump and graft should fit well together. The wedge is next taken out, the whole wound well covered with grafting wax, and the soil brought back again, and mulched with straw or leaves. All the buds are allowed to grow undisturbed through the summer, but the water shoots from the stump must be kept down; in the fall one or two canes are left, and pruned back to six eyes; all other wood is cut off.

There are sometimes cases where vines cannot be grafted so low, and perhaps several feet above ground only. If so, another method is adopted: The top of the vine is cut off likewise where the graft is wanted; then a three-inch vertical cut is made through the bark, which is lifted up; the graft, with two eyes and three-inch wood below, is cut half through horizontally back of the lower bud, and from the point below diagonally up to the cross cut. This wedge is pushed down under the bark, after the cross cut has been made to fit the stump or stock, that is, cut in slanting till the graft gets a vertical stand. It is then tied up with bass, covered thickly with grafting-wax, and finally wrapped in a piece of rag. The tying requires particular attention, as the air must be entirely excluded from the wound. Another method is practicable on young vines, seedlings, &c. The vine is cut off diagonally, and also the graft or scion; both cuts should be at least three inches long, and fit exactly together, the graft is laid on, tied with soft bass, and the whole dressed with grafting-wax, as above. When the vine is much thicker than the scion, the bark and some wood are cut off on one side only; the graft is cut diagonally; both cuts should match and fit, so that the *inner bark of the scion may lie exactly on the inner bark of the stump or stock*. This is the essential part of grafting, and in all cases should be observed. The union takes place first between the inner bark and wood, where callus is formed for new wood. The whole ope-

ration must be done very quickly, so that the circulation of the sap will not interfere with putting on the wax.

Improving by budding.—The proper season for budding grape-vines is the latter part of August, when the buds of the current year's growth are plump and the young wood is becoming firm. If possible, two or three year old wood should be chosen, in which to set the buds. Thrifty shoots are selected, and the soft eyes on the upper end rejected. The bud is cut out about two inches long, with as much bark as possible. In taking out the wood, a thin slice should be left at the basis of the bud, so that its roots may not be injured. Having prepared the bud, an upright incision is made in the bark about an inch and a half long; on the top of this a cross cut is made, forming a T, when the bark is raised up, the bud is pushed in, tied carefully with soft bass, and covered with grafting wax, only the eye being left exposed to the light and air. When the bud has taken, the old wood is cut off above it in the fall. Another mode, for which the spring is the proper season, is often practised with good success. Having ready the shoots, the upper and lower end, from which buds are wanted, the eye, with an inch of wood on, is cut off from the cane, together with half of the wood back of the eye. Then a similar cut is made in the stock where the eye is to be inserted, so that it shall fit exactly. The eye being set in, the whole is waxed and tied up as before.

Budding grape-vines is based on the same principle as budding fruit trees, roses, &c. By budding, different varieties may be produced on one vine, and, if chosen with regard to their maturity, blossoming at the same time, accidental hybrids may be obtained.

Improving by cross-breeding.—This method requires much time and attention, and cannot be much depended on, unless the plants are grown in a green-house or grapery, which is seldom to be found in connection with a vineyard. Such experiments are rather out of question with the practical grape-grower, as he is generally fully occupied with the work of the vineyard. But it is very important that those who have more leisure and proper skill should employ themselves in this highly interesting business. Or, still better, that it should be executed at governmental or State expense in experimental gardens and vineyards. It is highly appreciated, that the United States Patent Office has already commenced to carry out such a plan, raising and creating new varieties of grape-vines for distribution through the whole land, which will promote and encourage grape culture. But this is only a beginning. In addition to the propagating houses, a vineyard is wanted, where these new varieties can be tested and their character observed, in order to decide what soil and climate suit them best.

To obtain an improvement on a new variety, two well-known vines are selected; when they blossom, the anthers must be cut out, with scissors, from the blossom of the vine to be improved and impregnated; and as soon as the blossom is expanded on the other from which a better variety is intended, the pollen is collected with a fine brush from a well-blown flower, and applied upon the point of the pistil on the other vine. The seed of such a cross-breed will produce plants of a new variety.

CULTURE OF THE GRAPE-VINE IN THE VINEYARD.

Proper soil and position.—The best and most natural soil for the grape-vine is a dry porous lime-stone; the next best, a deep, loose, stony, loamy soil, even sandy, if it contain some loam and marl, and if a good subsoil be practicable. The soils upon rocks are favorable to the growth of the vine, as the roots find in the clefts the very essence of life—a loamy substance, containing phosphates. The less vegetable substances a soil contains, the better is it for the grape-vine.

In regard to position, a high, free, well-sheltered one, on the south-east slope of a hill, is the best; but level or rolling land may be made available by planting groups of pine trees on the northern part, to break the cold, strong winds. A vineyard, in all cases, should be open to the south and east, admit a free circulation of air, and not be under the influence of miasmas, dampness, and stagnating waters, or exposed to cold north winds.

Preparation of the soil.—As there are many instances where soil of the above description, in a naturally good condition, cannot be found, it must be meliorated, if position and other circumstances will justify such expense.

Strong, heavy soils require loosening, so that the atmosphere may have free action upon them, and therefore must be trenched. This is done in the following manner: on the lowest part of the land a line is drawn across, and six feet wide marked off; the top-soil, according to its richness, is taken up, perhaps from four to eight inches deep, and placed somewhere near, but out of the way; then a three-foot wide, and three to three and a half feet deep, trench is opened, and the earth thrown forward. This is the beginning. Now another three-foot wide strip is cut out, and the earth thrown into the open trench; three feet wide are marked for the next trench, and the top-soil from that strip thrown upon the first trench, which is filled up level with the surface; coming up at last with this work to the other end, there will be one trench and six feet wide surface left to be filled up and covered with the earth taken out of the first trench and the top-soil from the first six feet wide, which were thrown forward out of the way. This has to be carted up, first the subsoil for filling the trench, and next the top-soil to level with. On such lands the top-soil should never be thrown into the trench and covered with the raw subsoil, as the young plants have to depend on it for their first nourishment, till the subsoil has changed its texture, by the action of the atmosphere and manure, to a mellow, productive condition.

If the resources of a forest are near, where leaves, pine straw, rotten mast of branches, &c., can be obtained, all these should be collected, as the rough material to be thrown in the bottom of the trenches, and leaves, &c., mixed in layers with the subsoil. The fertilizing capacities of such substances are not of much account, but the advantage thus derived keeping the soil loose, to admit light and the action of the atmosphere, is all important. Whatever may serve that purpose, as stones, half-rotten stumps, &c., found on the land, and necessary to be cleared off, may be thrown in the bottom of the trenches. If sand, the

coarser the better, be convenient, it would be well to put it a couple of inches high on the top of such subsoil, as it will add greatly to its improvement.

Should the land require draining, this must be done before trenching; horse-shoe tiles, of four-inch diameter, will answer, but they should be laid at least four feet deep, with sufficient fall.

On a less tenacious soil, with a gravelly, loose subsoil, trenching may be performed by horses and plows, which considerably lessens the expense. A double Michigan plow and one of the largest subsoil plows would be required, and two double teams for each; the double plow will throw up a furrow about twenty inches deep, while the subsoil plow following it will loosen and deepen the soil in that furrow from twelve to fifteen inches more. If only two teams are at disposal, they must be changed from one plow to the other, going round first with the double plow, and following in the same furrow with the subsoil plow. By this mode of trenching, the good surface soil will inevitably be buried by the subsoil, and therefore it must be meliorated with compost. Naturally good soils seldom need trenching; all that is necessary is to remove all obstacles from the surface, spade or dig the ground over to the depth of a foot or eighteen inches, and plant the vines.

Manuring, and the best manure for the grape-vine.—The mineral manures, in consequence of their ingredients, have the most effect on the quality of fruit, and keep the soil in a porous, mellow, and productive condition; while animal and vegetable manures encourage the formation of wood too fast, and make the vine tender and subject to disease. Never should fresh animal manure be brought into the vineyard, but always be first composted with sod, or good surface-soil and charcoal dust, well rotten; and even then only used when young tender plants absolutely need support. On first-class land no manure is required, except a little well-prepared old and mild compost, with which to start the young plants, and to encourage their formation of roots. But heavy soils, after they have been trenched, should be improved by sowing leguminous plants on them before planting the grape vine, and receive a good dressing of lime. Peas, vetches, or buckwheat, would probably answer best; they should be sown pretty thick, and early in the spring; when they have grown to about six inches, it is time to apply the lime; twenty bushels per acre will be the least quantity, but more may be put on, if convenient. The lime should be strewn, in a well-powdered state, early in the morning, when the dew is on the plants. After the crop has blossomed, it is plowed under about four or six inches deep, and a crop of turnip may be raised on it the same year, partly paying the expense. By such treatment, and the application of lime, the soil becomes mild and admirably adapted to support the grape-vine; it can be kept in a highly productive condition by alternate application of green manuring and lime, and once in about five years of eight hundred to one thousand pounds of bone dust, all of which must be plowed under and mixed well with the soil.

Sandy soil must be treated in the same way, marl and leached ashes being added, to make it more consistent. Ashes and lime should never be applied with bone dust, as they will weaken its fertilizing capacities by driving out the ammonia. The ashes and lime, while they

furnish the plants with oxygen, act at the same time, through their salinous substances dissolving and cooling upon the soil, to keep it moist; the bone dust, again, contains the most nourishing elements, which, in addition to the other substances, promote the prosperity of the grape-vine. When the planting of a vineyard has been concluded, resources should be explored whence proper material may be obtained for manure. The first step is to begin with a compost heap, which should be of such dimensions as to correspond with the size of the land to be prepared for a vineyard. A large quantity of charcoal dust, the unmarketable refuse, to be had, in most cases, for nothing, if carted by one's own team, with leaves, pine straw, and such stuff, which can be scraped off in the forest, muck, &c., should be provided; anything raked and swept in the yards, barns, and stables, will be acceptable; nor should be forgotten a large cistern to gather all the liquid manure from the animals. When all these materials are at hand, the construction of a compost heap may be commenced by a layer of sod, muck, or good soil, a foot high; on this, stable manure a foot high; this again covered with charcoal dust two inches high; now again six inches of good soil, sods are best; on this, manure, leaves, &c., and again charcoal dust and sods, or muck, manure, or leaves, &c.; charcoal dust continued till the heap gets six or eight feet high, when a new addition has to be begun. The heap should be kept level and not too small on the top, so that the air and rain may equally penetrate it.

In two or three months this heap may be worked over, by which its contents will become well mixed and fit for use. But it will improve by age. It is often surprising how much material can be collected for this purpose, and how clean and neat the while a farm-yard appears! In the same proportion that the land is made productive, so the barns and cellar will expand and fill up with treasures.

Planting the grape-vine.—Before beginning to set out the plants, the land should be laid off in squares, according to its size, perhaps from one to two or more acres, with convenient roads between for the passage of teams and carts. On side-hills, impassable for teams, these avenues may be narrower. Next to be determined is whether the vines shall be trained on trellises or stakes. This will indicate how much room they require. In a northern climate, trellis culture is preferable, while in the south stake and bow training are more advantageous. The reason for the northern mode of training, is to keep the vines as high as possible from the ground, as its dampness causes rot and mold on the lower fruit. But in a hot climate, it is desirable to have the ground shaded to retain the moisture. Therefore, in this case, the vines should be trained low and on stakes, and the spur and bow system practised. In regard to the space allowed them, six by eight feet will be about the proper distance for trellis culture, and four by four for stake and bow training. In the first instance, nine hundred and seven plants to the acre will be required, and in the second, two thousand seven hundred and twenty-two. The rows should run from east to west, to receive the first and last rays of the sun, at morning and evening, on as large a surface of the ground as possible. After the course of the rows has been decided, the distances for the plants in the rows are measured, and a stick inserted where the vine is to be

planted; then the holes are made, which should be a foot deep and three feet wide. A shovelful of good mild compost is put into each hole, and well mixed with the soil; being ready for planting, the different varieties are counted over, and the places for each selected. Every variety has its own merits.

To make a good wine, free from that peculiar taste which wine has when made from one variety, several kinds must be planted, selected with regard to their qualities; one to furnish bulk, another to give body and consistence; one to be rich in sugar and vinous acids, another to furnish flavor, another aroma, another color, and still another to unite all these qualities, &c. The nearest proportion of one to the other of the varieties here named, or rather their requirements to make 100, would be: 60, 20, 3, 3, 9, 5.

Of rooted plants layers are the best, they having completed the formation of roots, and being able to bear the second year after transplanting; sickly, tender, and poor-rooted vines can be rejected, as there is a chance to examine them. It requires two persons for planting, one to take the plant and spread out the roots evenly in the hole, while the other brings in the soil, well pulverized, shovel by shovel, and keeps gently moving the plant up and down, in order that all the fibres may come in contact with the earth, and no cavities be left among them. After the hole is filled, the earth is pressed down gently with the foot, and thus is the work finished.

When no rooted plants are at disposal, and resort must be made to cuttings, they should be five eyes long; the instrument described on a previous page will be the most convenient to plant them with. Of course, no holes need be dug, but the places will have to be marked by a stick. They are planted by couples, that is, two at a place, and pushed in, slanting, to the last and uppermost eye, leaving one eye only above the surface. In the north, the spring is the best time for planting; while in the south, the fall is best for rooted plants, and spring for cuttings. Rooted plants have to be cut back to two eyes, the young shoots of either are left without tying the ensuing season, as they will get a stronger body by being left loose, and in a bending position.

In northern countries, especially in the New England States, there is, at present, but little choice among varieties; the Diana, Delaware, Isabella, Catawba, &c., will not ripen there; with a few exceptions, in very favored localities at least, their maturity cannot be depended on in general open-vineyard culture. But the Concord, Hartford Prolific, and several of those investigated and noted contiguous varieties, can be relied on, such as Case's Crystal, the Bartlett, Dracut, Amber, &c. Together, if cultivated well, they will produce a pretty fair wine. In milder climates there is less difficulty in choosing the proper varieties for a good wine; besides of several highly improved native grapes, German and Hungarian varieties may be cultivated with success, if attention be paid to their habits and qualities. In all cases their time of maturity should be alike, that they may be gathered simultaneously.

Pruning and training the grape-vine.—This is one of the most essential points in grape culture, as development and productiveness are



directly affected by it. The proper knowledge can only be acquired by practice and experience. It would be prudent for an inexperienced person to engage a practical vine-dresser to prune his young vineyard once or twice, and accompany him and take lessons, rather than to experiment himself according to the wild, unsound theories prescribed by professional book-makers. It is easy to give rules in general reliable, but there are often circumstances in which none of them can be applied, when the theorist is no longer able to decide his course. Indeed, it requires practical knowledge to prune and train a grape-vine well. Much has been done, in those countries of Europe where the grape-vine is cultivated, for the education of practical vine-dressers, either by their respective governments or by agricultural societies, schools having been established especially to promote that branch of horticulture.

The best time to prune the grape-vine is late in the fall, or, when the weather permits, during winter, as the plant is then in a dormant state. The young rooted vines, or layers two years old, which have been cut back to two eyes by transplanting, will have made two shoots during their summer's growth; these are pruned back, if trained on trellises, to six eyes each; if on stakes, one to six eyes; the short end, called the spur, to furnish bearing wood the next year, and the long end, or bow, to bear fruit. On cuttings, the single shoot which they produce the first season is pruned back to two eyes, and so all young and tender-rooted vines. During the ensuing summer nothing more is to be done than occasionally to tie up the young, growing shoots, and keep the weeds down by plowing or hoeing. Fruit-bearing branches must be nibbed back two leaves above the bunches. A crop of turnips, carrots, or cabbage may be raised that season, which will facilitate the growth of the young grape-vine.

The second year, on the strongest vines—now four years old—both ends are lengthened by six eyes from the young wood, and the rest cut off; from the side shoots all new wood is removed, except one spur of two eyes on each shank, for making new wood; the following spring, these two shanks are tied horizontally on the first wire or lath of the trellis. During their summer's growth, all the shoots on the bearing canes are nibbed back to the second leaf above the fruit, as soon as the fruit has well set, and water-shoots broken off as soon as they appear. The shoots from the lowest buds on the spurs, after they have made two feet growth, are pinched in two, and the other shoot is allowed to grow; all the young shoots must be tied up several times through the season. The third year, the longest canes from the spurs are trained up to the third wire, or lath, or both, of the trellis, and cut according to the length required, to permit them to be tied on one foot long, horizontally. Every second bud on the vertical part of these canes is broken out, the rest left for fruit spurs; and the short shoots on the spur are pruned back to two eyes, to bear. After this, the vine must be kept in such trim as to produce alternate fruit and bearing wood. Those canes which had fruit are pruned back to one eye, to make bearing wood for the next year, and alternate canes to two eyes, to bear the present. It requires skill and experience to manage vines on trellises, in order to get large crops without weakening the plant.

There are many different modes of training vines on stakes, according to the soil, climate, and skill. They may be trained without stakes, on one or more, in spiral or pyramidal form, &c.; but the most common and simple manner is the spur and bow system. The second year they are cut back to two buds, of which two canes are obtained. The third year, one of these is cut back to a spur of two eyes, the other to a bow of six eyes; the first to form wood for the next year, and the other to bear fruit. The fourth year, the bearing cane, or bow, is cut back to two eyes; the canes on the spur one, which is the lowest, to two; and the other to six or eight eyes. The fifth year, and thereafter, there will be two shanks, each with a spur and bow, changing alternately to spurs and bows. The length of the bow must correspond with the age, strength, and condition of the vine. All the wood on the young bearing shoots must be pinched off, after it has grown two leaves above the fruit. Water-shoots, and those which are not wanted for either spurs or bows, are taken off by summer pruning. In bending and management of the bow lies the art to raise large, fine clusters of superior qualities, without straining the bearing capacities of the vine. Bows and fruit spurs must always be bent, in order to concentrate the sap in the fruit buds and check the formation of wood. For this reason, also, they must be cut loose from trellises or stakes in the fall, and, after pruning, left hanging down on the ground during winter. In the spring, after the vines and bows have been tied up, and the ground is dry and settled, all the dew-roots, or small fibres near the surface, are cut off; a heavy-pronged hoe is used for the purpose, to remove the ground about six inches deep from the vine, to facilitate this work; the soil is put back again afterward.

The object of this operation is to induce the vine to push its roots deep in the ground, for better nourishment, and to check its tendency to superabundant wood. By this mode of root pruning, it is easy to keep the vine in proper bounds, to render suckers and water-shoots less prolific, and greatly to improve its fruit. Stakes will last twice the time if they are taken up every fall, and put under cover during winter, or, at least, piled up, bottom point uppermost. About a fortnight after root pruning, the soil needs stirring; if this can be done with horse and plow, it will be an easy task, otherwise it must be spaded or hoed; the garden fork will be the best instrument. This is a good time, also, to manure with lime, ashes, or bone-dust, and mix them with the ground.

After the second summer pruning—that is, when the fruit is nearly full grown—another plowing or digging of the ground is necessary, in order to keep the weeds down and the soil open and free to the action of the atmosphere. When the fruit begins to color and ripen, it is of great importance for its perfection, as well as to strengthen and mature the new wood, to top the young shoots which are left to grow as bearing wood for the next year, and thus to check their growth. During the summer, indications of disease often appear on the vines, which may occur from different causes; they are perceptible in the color of the leaves when they assume a dull, pale, yellow color, commonly after several rainy days, or sudden changes of the weather from very hot to cold, chilly, and cloudy days. When the leaves having this

appearance begin to shrivel up, insects will be found the cause—the aphid—which will generally appear after very hot days and thunderstorms, the sun coming down hot on them, while dripping with water, and no motion of the air. In both cases their organism and functions are irritated and made sick. The best preventive is a high, free, and open position; the cure, the application of plaster or sulphur. Therefore, plaster should always be kept in readiness. In either case, a good dusting of it all over the vines early in the morning while the dew is on, and this several times repeated, will excite the action of the leaf again and destroy the insects. Sulphur, as it is more expensive, may be reserved for other and worse diseases—the rot or mold on the fruit. If this makes its appearance, a good dusting of it will stop the disease. But, again, a high, free, open position, and a gravelly, porous soil, are the best preventions.

Protection of tender plants during the winter.—With very little trouble, tender plants may be protected from the destruction of a severely cold winter, and foreign varieties cultivated with success, even in a northern climate. All that is necessary is to lay the vines flat on the ground late in the fall. With the garden fork the soil is taken up about nine inches deep on one side of the vine, which will prevent it from breaking, and brings the vine so much better down and even on the ground; after this object is gained, the earth is replaced and a few forks full added; the canes are taken together, laid down, and covered at some convenient place with earth or stones to keep them in such a position. This simple operation will preserve them in a sound, healthy condition, and increase their fruitfulness. In the northern part of Germany, where corn cannot be grown on account of the coolness of the summer, the highest cultivated varieties of grape-vines are produced with good success; the winters there are as cold as in the northern parts of our country, and would destroy the plants as well as here if they were not thus protected. As a proof that foreign grape-vines can be cultivated in this country, even as far north as Boston, it may be stated that Mr. Harding, of that city, has cultivated and fruited the "Sweet-Water" in open ground for many years with great success; and, in fact, this vine looks as healthy and thrifty, and bears as regular and large crops as could be expected from the best treatment under glass. So has Mr. Syfferman, in Malden, north of Boston, several highly improved varieties from the Rhine growing in the open land of his garden; such as the Trollinger, Gutedel, Elbing, Traminer, and white and black Burgundy, and has obtained from the first kind, for five years, a regular and full crop annually. Of course, these would be destroyed if left unprotected, or, at least, so much injured as to render them subject to diseases and insects. Protection through the winter and good culture have proved that foreign grapes can be successfully cultivated in our country. Nothing pays better than a little extra care and good management of the vine.

German, French, and Hungarian methods compared to ours, with regard to their adoption.—Although these methods are based on one and the same fundamental principle, there are some considerable variations in the culture and training of the vine, according to old habits, soil, and climate. With the introduction of grape culture into this

country by the Germans, their system has likewise been adopted. On the Ohio, Missouri, and Hudson rivers, south, east, and west, wherever the vine ornaments the land, it has been planted, with very few exceptions, by Germans; they have succeeded well by their modes of culture; modern improvements in the propagation and culture have been adopted, step by step; so that if we bestow the same care on it as in the other country, there will not be much difference from the general German system.

The prevailing French mode is, in general, either the trellis, or bow and spur system, practised, perhaps, a little more artfully and exactly to the point. But the Hungarians have a different way of pruning and training; they do not allow wood to grow for shanks and branch canes, but cut all off, low on the ground, every year; the stock forms a head, from which one or two shoots are allowed to grow and bear; in the fall they are cut off, and the stock covered with coarse manure, or litter. One other mode is, to raise alternate shoots, one to bear, the other to form wood for next year; the bearing canes are bent down, and a few eyes covered with earth, to strike roots near the top, where three or four are left to form a new plant, and bear at the same time. Canes thus treated bear very heavy crops, as they have two sets of roots for their support. I am not aware whether this mode has yet been introduced in our country, but it would be well to try it. The vines must be trained to it while young; the first growth will have to be pruned back to one eye to form the stock, and afterwards, every fall, back to the socket of this bud; all other shoots, except one or two, are broken out.

THE STATE OF THE GRAPE---WHEN AND HOW IT SHOULD BE GATHERED, AND APPARATUS FOR WINE-MAKING.

Signs when the grape is ripe, and may be gathered.—There are certain signs when the fruit has attained its perfection: the green stem of the cluster changes to a brown, woody color; the bunches begin to hang down heavily on the canes, the berries getting soft; a thin and transparent skin; the juice vinous, agreeable, sweet, thick, and adhesive; the seeds free of the pulp, and dry.

Disadvantage when the fruit is unripe, or dead-ripe.—In the first case, the formation of sugar is not developed, hence the predominance of acids in the wine, and its inferiority. In the second case, the necessary vinous acids are lost to neutralize, and give character to a syrup-like wine, not to take in account the great loss in quantity.

Gathering, sorting, and transporting the fruit to the press.—When it is determined to gather the vintage, sufficient help should be provided in order that enough may be collected every day to fill a large fermenting vat in the evening or night; sharp pruning knives or scissors should be used, to prevent jerking and dropping the berries. When a bunch is cut off it has to be examined, and all dry, green, and rotten berries picked out and thrown away, while unripe and other imper-