appearance begin to shrivel up, insects will be found the cause—the aphis—which will generally appear after very hot days and thunder-storms, 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 last 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-

fect berries or bunches should either be allowed to remain on the vines, or sorted out and gathered by themselves. The bunches should be handled carefully, so as not to bruise them. Clean wooden pails are best to use, each hand being provided with one; and for transporting the grapes to the mill or press, a wooden tub, constructed in a cylinder form, but flat on two sides and a little wider on the top, with straps, so it can be carried on the back, and holding from two to three bushels, will be found very serviceable; or, if the distance to the press is considerable, a wagon with large tubs on it will be required, the tubs to have wooden covers. Clear, dry weather must be chosen for gathering the grapes, and the operations must not be begun in the morning till they are perfectly dry.

The quality of the wine will be much improved if the grapes are visited by a slight frost before they are cut off; particular pains must be taken to have everything used in gathering clean to the utmost; and no lunching or eating should be allowed near the vessels where the grapes are kept, as the smallest quantity of bread or any eatable coming in contact with the grapes or juice will produce disastrous effect on the wine.

The wine-press and its apparatus.—In the vineyard culture, a good wine-press is most important. It is composed of a platform, frame, and screws. The best seasoned white-oak should be used; the platform to be of four inches thickness, the frame of sufficient strength, and the screws either of wood or iron, but strong enough to answer the purpose. A large press with two screws is always preferable to a small one, as it performs the work more thoroughly, and a greater part or the whole of the vintage can be pressed at once, which is a consideration in making wine according to the principle that the quicker the operation of gathering, pressing, and filling into the casks, the better its quality. The press should be near, or above the cellar, with all its apparatus, fermenting vats, &c., inclosed in a building erected chiefly for that purpose; and nothing else should be kept in the press-house. It should be substantially built, have good ventilation, and be capable of maintaining an even temperature, as this is very important while the must is in its fermenting process. Next to the press, an apparatus is required to mash the berries. This may consist either of a grape-mill, with two iron rollers or cylinders, a deep, strong-built tub, in which they are crushed by a beater, or a pair of boots with double soles and without heels, long tops, and unblackened, to tread the berries on the press, or in a box with holes in the bottom to let the juice through, having hinges, hooks, and staples on one side to open for the mash or trester to be let out. There are cases, also, when, it being desirable to exclude the stems, a strong wire sieve, with about an inch-wide masher, will be necessary.

The fermenting apparatus and casks.—The size of the fermenting vats should precisely correspond with the dimensions of the vineyard, in order to get the whole vintage into one or two. As the average yield from an acre of well-cultivated vineyard may be set down at four hundred gallons, the vats should be one fifth larger, for the expansion of the must while in a fermenting state; by calculation and comparison it will be ascertained how large they should be. Well-seasoned, two-

inch white oak planks should be chosen for the construction, and hoops one third of an inch thick, of good soft iron, connected by a screw, that they may be loosened or restricted according to the swelling of the wood. The proportion should be as three to four, or one-fourth higher than wide. When the vat is thus far constructed and set up, a false bottom is made, from well-seasoned white pine boards, and holes bored all over, for the purpose of putting it on the husks, to prevent their rising and coming in contact with the air. Its position must be regulated by two or three sticks, of two inches square, let through by means of a dozen holes in each, with one wooden pin underneath and one above the bottom; the sticks or joists to rest against the cover of the vat. It may be placed two feet or more under the surface of the must, and the pomace kept down that much.

A strong cover must likewise be constructed as a head for the vat. It is fastened on by means of grooves, like the heads in casks. This cover should fit well, so that all external air may be excluded, and screwed and pinned together in one piece. When putting it in, the screw on the upper hoop is loosened, to make it easy, and when the head is accommodated in the grooves the hoop is again screwed tight. To regulate the formation of carbonic acid gases and their outlet, and to prevent an explosion of the vat, a two-inch hole is bored through the head-piece, into which is fitted a tube-bung—a cylinder made of white tin. It may be constructed like a yoke-bow, rising with the shank fixed in the hole about eighteen inches, and the other end coming down within six inches of the cover, and terminating in a vessel of water.

Another hole, three inches wide, is made in the head, into which a bung is fitted, with a two-inch hole bored through; on the top of the bung is nailed a piece of sole leather on one side, on which a two-pound lead is placed, to hold it firmly and exclude the air; the leather at the same time acting as a safety-valve, in case the gas should develop very rapidly. As the vat should never be filled to the top, but about eighteen inches space left between the head and the must, another small hole is made through one of the staves, to show when the vat is filled to that point, which is then closed by a wooden pin or plug. Again, another hole is required, about the middle of the vat, to admit a small faucet, by which must may be let out to be examined. Finally, a hole is made close at the bottom, for a large faucet, to let off the young wine when it has finished its fermenting process.

There is still a better apparatus for examining the must while in its different stages of fermentation, and to indicate the quantity in the vat. It is a glass tube, or cylinder, about an inch thick, inserted near the bottom of the vat and forming a right angle, the other end running close along the vat to the top, and fastened to it by a staple; the capacity of the vat is indicated by marks on this tube, showing precisely how many gallons it contains, with the state of fermentation, and the changes of color in the must. When the color of the wine is a great object, this is one of the best contrivances to determine when the young wine should be drawn from the husks.

For a small vintage, a large cask or pipe may be fixed up to answer the same purpose; the head with the faucet hole is taken out, a false

bottom fitted in, a hole for a faucet bored near the bottom, and the other fixtures added.

The casks for receiving the young wine from the vats should be large, holding from one to two thousand gallons each, or the whole vintage; they should be made from the very best seasoned white oak, having strong iron hoops, with screws attached, a common two-inch bung-hole, and in one head a door, eighteen by twenty-four inches wide. The door is fastened on hinges, opening inside, and has two stout bolts and a cross-bar of oak outside, with two holes, through which the bolts are passed when the door is closed, being further fastened by two notches with wings. Another small hole is made in the middle of the head, in which a wooden faucet is inserted, for drawing out samples. The door is intended to admit a man, for the purpose of washing and cleaning the cask.

As such large casks cannot be removed from the cellar, particular care is requisite to keep them clean and sweet, but they will last any length of time if made of good material. A cask for keeping wine should never be used for other purposes. As soon as it is empty it must be washed clean, inside and out, well sulphured, and the bung driven in again. It should be kept in an airy, shady place till wanted for use; the press-house would be the most suitable.

A couple of pails are necessary for exclusive use in the cellar; they are generally made of oak, and in the form of a vase, having a narrow neck, but widening again at the top, which is made of copper or iron, the hoops and handle being composed of the same metal, and should hold exactly five gallons, being gauged to show by a mark each single gallon.

Funnels of different sizes are also wanted, the largest to be made of oak wood, holding about six gallons, with a copper or iron tube on the bottom, to go into the bung-hole of the casks, and two staves projecting three inches at the bottom, for two feet, to make it stand firm, a little declining towards the tube-hole.

Lastly, for drawing wine in or out of the casks a good siphon is required. This may be made of tin or lead pipe, but, for convenience, should have a small faucet soldered on, as a mouth-piece. All these articles should be kept as clean as everything pertaining to the cellar and presses, and never used for any other purpose.

The cellar, how it should be constructed.—A good, well-ventilated and drained cellar is absolutely demanded for wine making. To secure an even temperature, it must be deep, and arched over with stone or brick, the stone-work smoothed off with plaster, and whitewashed; the floor either of flag-stones or brick; and to prevent the hot summer air getting in, and likewise the cold in winter, a separate entry for the steps is required, with a door at the top and another below. Several air-channels or flues must be arranged from the arch to a couple of feet above the ground outside. The arch is covered with from four to six feet of earth. And this is now the most practical spot to build a house large enough to contain the press, a fermenting room, with conveniences for heating, connection by conduits with the cellar, and perhaps a separate room for distillery apparatus.

WINE-MAKING.

Making white wine.—To make a first class white wine, only white grapes are used; they are mashed in the apparatus, being fixed on the top of the fermenting vat, but not allowing the husks to fall into the vat, which, after being mashed, are put on the press, and when the whole mass is thus prepared, they are pressed out, and the juice, or must, put in the vat. As there are no husks in the vat, the false bottom is not required. The head, or cover, is now put on, and the temperature of the must ascertained by the thermometer. If it is lower than 50°, some must is taken out and heated, to warm up the whole mass till it comes up to 60°, which is the point it should be brought to when fermentation takes a proper course. This temperature must be maintained as evenly as possible, and therefore a proper room, as already described, with a stove or fire-place in it, will be the most serviceable. After the temperature of the must is regulated, the bung with the safety-valve and the tube are fixed on, and a small vessel with water is placed under the other end of the tube, or cylinder, so that it will reach into the water about three inches. The whole work of mashing, pressing, regulating the temperature, and closing up the vat, must be performed with the greatest possible speed, as the juice begins to ferment as soon as it is extracted from the berries, and by coming in contact with the atmosphere, the most essential part of the wine, its chief strength, the alcohol, escapes. In proportion as the grape contains sugar, the fermentation of the must will proceed; hence the fermentation of the must from highly improved grapes of best qualities, containing much sugar, and a vintage favored with a hot, dry summer, will take twice as much time as poor and watery juice. By fermentation, the sugar of the grape-juice is converted into alcohol, which, amalgamated with the other contents of the grape-juice, forms the wine, at once fiery, aromatic, and pleasant in every respect. The dissolution of the greater part of the sugar, and the union with the acids gluten, tannin, &c., will have been performed when the must begins to get a clear color, an aromatic, vinous taste, and quiet; it is then time to draw it from the fermenting vat into the casks, in which it will slowly finish its fermenting process. Rich must will ferment in from five to eight days in the vat, while that of inferior quality gets through in two or three days. It is very important to have large casks in which to keep the wine, as thus its properties and character are much better preserved.

When the casks have been filled, a similar tube is fixed, as on the fermenting vat, with one end in the bung-hole and the other in a small vessel of water.

Making schiller wine.—This name signifies a particular color of the wine, varying from one hue to another, and to be called neither white, yellow, nor red. Grapes of all colors are used in making this wine; they are mashed by putting the mill on the top of the vat, and the husks put in it, and fermented together with the must. When they are all mashed, or one vat is filled, the false or fermenting bottom is set in, to keep the husks under the must, and the head and other fix-