

mate will be obtained, from the result of the analysis, as to the capability of the wine. For instance, the fruit of a vine which grows on a wet, cold soil, in a low, shaded situation, and in a severe and rough climate, contains eight per cent. of sugar, the vine thus possessing the points required of a good grape; yet, in most cases, by being translated to a better soil, position, &c., with proper culture, it will attain from twelve to sixteen per cent., and, of course, produce a superior wine. Analysis, therefore, gives a surer basis to judge and select wild grapes than the simple taste, which is as various as deceptive; at the same time, it will bring to notice such varieties as, differing from the common and fashionable sweet grapes, contain precisely the properties essential to make several of the most highly esteemed wines.

Late frosts in the spring, and especially some sharp visitations in June, checked the grape-vines, and totally destroyed those on level parts of the country; only in elevated, sheltered portions was there any saved, and far less than the usual crops. My investigation was, therefore, limited to such favored locations, while even here the means allowed were not sufficient to enable me to extend my labors to a larger scale. The result is highly valuable and stimulating for the culture of the grape. I found, in general, a lively interest among all classes for this noble and lucrative branch of horticulture. The intention of the Patent Office to encourage the culture of the vine through the whole country, by collecting and disseminating knowledge relating to it, and the best methods of wine-making, was well appreciated, and especially so on account of the direct way which had been chosen. Personal observation and instruction will often, in one hour, be more beneficial than long study of scientific essays, which are, for the most part, written in too high a style to be clearly understood by the plain, practical man. By those interested in this pursuit earnest wishes were expressed that the Patent Office might continue its noble efforts.

In a country like ours, blessed with everything to make life pleasant, and possessing a proper soil and climate for every plant, why, otherwise so favored, should man be deprived of the real essence of life, wine? True, this incomparable nectar is not unknown here, for many thousand American eagles of gold cross the Atlantic annually to bring it to us; but this privilege is attainable only by a few, while the mass of the people may not receive this best gift of Nature. Substitutes have been invented, but they are poor indeed, compared to genuine wine, which makes man social, contented, and happy, while those mixtures and drugs, at once exciting and stupifying, demoralize him. As wine is a pure beverage which Nature furnishes, its use should be attainable by every one; while it inspirits the youth to all that is fair, good, moral, and grand, it stimulates the man in his labor and occupations, makes him a brave husband, father, and citizen, and brightens the evening of age. As wine has so beneficial an influence on the nature and character of the individual, it will likewise exalt the condition of a whole people; consequently, there is reason why we should exert ourselves to introduce the general culture of the grape in our own country, as has been done for centuries in other lands.

For the use and comfort of a single family, a small piece of ground, by intelligent management, will produce sufficient, while if the area be extended, the profits obtained will prove a liberal encouragement. Many hundred acres, exhausted by our bad management, but yet containing enough mineral substances to support the grape-vine, might, with little expense, be converted into vineyards. Those black and barren hills, gloomy as they look, will, in many instances, afford desirable situations for this purpose, and can thus be changed to profitable plantations, highly ornamental to the country. By a proper selection of the position and of the varieties adapted to the climate, the grape-vine may be successfully cultivated in every State of the Union. It will flourish wherever corn will grow. But before embarking in this enterprise, it is necessary to understand the principles of the culture and management of the grape, and the mode of making wine.

## CULTURE AND MANAGEMENT OF THE GRAPE, AND THE MODE OF MAKING WINE.

BY JOHN F. WEBER, OF WASHINGTON, DISTRICT OF COLUMBIA.

### PROPAGATION OF THE GRAPE, BY LAYERS, CUTTINGS, EYES, AND SEED.

*Layers.*—Supposing the vines are old, and growing wild in the woods or fences, the best branches should be selected, those which have made strong and well-matured wood. They must be bent down to find where the last year's growth reaches the ground, in order to see what space they require; the length and number of the shoots will give the best indication. The land should be cleared of stones, stumps, sod, and roots, trenched to the depth of from fifteen to eighteen inches, and enriched with well-rotted compost. Heavy and stiff soil needs to be meliorated with sand, to the texture of good garden earth, after which small trenches have to be dug for each single shoot, about a foot wide and six inches deep. The branch is now taken down and secured to the ground by a strong wooden peg with a hook. It is not necessary that the branch should be prostrated quite to its root, but precaution must be taken not to break it by bending. The shoots of the last year's growth are then taken and deposited singly, each in a trench, fastened by little wooden pegs, care being used that they lay close at the ground. These shoots must have been previously examined, all dry and immature wood cut off, and only the sound, well-ripened wood employed. The best time for that operation is when the buds have made two leaves. They are left in this position, uncovered, till the eyes have attained three or four inches growth, when a regular circulation of the sap will

be effected; they are then covered with fine, pulverized earth, about an inch. It is very interesting now to observe how quickly callus is formed under each eye, from which small roots will emanate in the course of three or four days. In eight or ten days the formation of roots will be completed, when two inches more of earth may be put in, and in a fortnight after another inch, which is the final covering. In dry, sandy soil, or when the summer is unusually hot and arid, it is prudent to mulch these young plants at once, two or three inches, after the last covering, with straw, leaves, or tan-bark. This will keep the ground moist, and protect the young, tender roots from becoming dry and burnt. Late in the fall, when the plant is in a dormant state, the branches which have been layered are cut off close at the old wood, carefully taken up with a garden fork, so as not to break the roots, and divided. There will now be obtained from each eye a strong, well-rooted plant. These young offsprings are now taken and heeled in the ground, where they remain through the winter, or till they are wanted. The branch of the old vine remains in its bent position; the next spring shoots will grow out near where the layers had been cut off the year previous; when they have made about twelve inches in growth, the stump or basis of these young shoots is covered with good rich soil, about six inches, in order that roots may emanate to render it independent of the old vine. They are left to grow during the season. The next spring they are layered again, and another set raised in the same manner. By this manipulation, vigorous plants can be propagated from an old vine every second year, and will bear the second year after planting. In regard to their strength, and the development of their root system, they are preferable to any propagated from eyes or cuttings.

Making layers from vines in a vineyard is far more easy, as the ground is already in a good condition, and the vines in a more active state. In the time of summer pruning, one or two strong shoots are left, as close as possible to the ground, on the vines from which layers are desired; they remain hanging down through the summer, undisturbed, and the next spring are treated as already described. It is important, in all cases, to let them hang loose, till all the eyes are well developed, and have made at least half an inch growth. This method is always sure, as it corresponds with the principles of the physiology of the grape-vine, which, like other young plants, requires for its development an equal share of light, warmth and moisture.

*Propagation from cuttings.*—This is a very simple procedure. In the fall or winter, shoots are selected from the strongest and best ripened vines, cut three or four eyes long, tied together in bunches of from one hundred to five hundred pieces, and either put in the ground and well covered with earth, or kept in a cellar during winter, covered with sand. In the spring, as soon as the ground is dry, a partly shaded spot is chosen for a plant-bed. The soil should be dry and warm; it requires trenching about two feet deep, and meliorating with compost and sand till it compares well with hot-bed earth. This plat is laid off in beds four feet wide, and two feet are left between for a path. There will be room in such a bed for four rows of cuttings. In order to plant them at equal distances, the ground should be measured and a line drawn. The wood, on the lower end of the

cuttings, should be cut off close to the eye. To keep them moist, it is well to wrap them in a piece of old cloth, and take up only one bunch at a time. There is an instrument generally used for that purpose, which greatly facilitates planting; it is made of a piece of wire, half an inch thick and two feet long, a cross handle at one end, and the other flattened and bent to an angle of 45°. In the flat end an opening is prepared in the shape of a V, wide enough to admit the cutting. With this instrument, called a plant-stick, the cutting is pushed into the ground in a slanting position, and only one eye left out, near the surface. It should never be inserted deeper than four or five inches. In dry weather, the plants require watering every second night, till they have formed roots and are established; they must be kept clean, and no weeds allowed to grow in the bed. In the fall, they are taken up carefully, with a garden fork, and heeled in the ground again during winter. Next spring, they may be removed to the vineyard, and will bear the third year. But if strong-rooted vines are wanted, these rooted cuttings have to be planted once more in the bed, but require now at least a square foot of space, and their last year's growth to be cut back to one eye, and taken up again in the fall and heeled in.

*Propagating from eyes.*—This can be done only under glass, either in a propagating-house, green-house, or hot-bed, as otherwise no good results can be expected; still, if trouble is not regarded, eyes may sometimes be propagated in boxes, or even in the open ground.

Strong and well-ripened canes should be selected. They may be cut eight or ten eyes long, heeled in sand till wanted, and put in the cellar, or in any place where the frost cannot reach them. In order to get large plants the first season it is necessary to begin their propagation early; February is generally the time when they are started. If a propagating-house with a sand bed be at disposal, little furrows are made in the sand about half an inch deep, and two inches apart, in which the eyes are placed horizontally; they are then covered with sand and drenched well; a temperature of from sixty-five to seventy degrees must be maintained till they have completely rooted. In common green-houses pots are generally used; they may be of different sizes, but should not be smaller than two pints. After some broken pieces of crockery, oyster-shells, &c., have been put in the bottom to secure a good drainage, they are filled to half an inch of the top with earth, and four to six eyes are stuck in vertically, so that the point of the eye just peeps out. They are well drenched, and placed in the warmest part of the house. In hot-beds pots are likewise more convenient than open beds. They should be constructed as usual for raising plants, with a bottom heat of from fifty-five to sixty degrees. The pots with the eyes are put in dry saw-dust, or tan-bark, and raised within six inches to the sashes. In order to preserve an even temperature, constant watching is necessary, and every opportunity, when the weather is clear, and the atmosphere warm, should be improved to give air so as to prevent mold and rot. Straw-covers and board-shutters must be provided for cold nights and stormy days. In proportion to the development of the plant must be the quantity of air admitted, and finally the sashes will have to be removed during the day, and only kept on in the nights. When at last the spring has fairly opened;

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