

**PROPAGATION OF THE VINE. HOW TO
REGULATE VINEYARDS BY THE USE OF
SEEDLINGS. A TREATISE ILLUSTRATING THE
SUPERIORITY OF CONSTITUTIONALLY PERFECT
ROOTS. ALSO AN ESSAY ON THE PHYSICAL
AND MORAL INFLUENCE OF THE VINE**

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Propagation of the Vine. How to Regulate Vineyards by the Use of Seedlings. A Treatise Illustrating the Superiority of Constitutionally Perfect Roots. Also an Essay on the Physical and Moral Influence of the Vine by Charles A. Wetmore

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CHARLES A. WETMORE

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P R E F A C E .

TO THE VITICULTURISTS AND OTHER FARMERS OF CALIFORNIA.

This pamphlet is respectfully dedicated to the viticulturists and farmers of the State of California, to whom all who desire to witness the rapid advancement of industry and good society, and the creation of happy and comfortable homes for our people, earnestly appeal for continued intelligent exertions in ascertaining and demonstrating the practical possibilities of agriculture. The object of this work is not to create controversy, or to maintain a pet theory, but to stimulate experiment in the field of scientific agriculture and to induce the wanderer to settle down under his own vine and fig tree.

CHAS. A. WETMORE.

OAKLAND, CAL., March 1st, 1880.

201839

PROPAGATION OF THE VINE.

PRINCIPLES OF VITICULTURE RELATING TO DEVELOPMENT OF PERFECT ROOTS DISCUSSED.

THE WILD VINE OF CALIFORNIA—ITS VALUE FOR GRAFTING STOCK AND WINE MAKING.

A CHAPTER ON SILVANERS OR ZIERFAHNLS—EUROPEAN VINES OF SYLVAN ORIGIN—PHYLLOXERA IN FRANCE.

REPRINTED FROM THE COLUMNS OF THE SAN FRANCISCO MERCHANT.

During the period of my observations and studies in France, in 1878, concerning the phylloxera plague, my attention was especially attracted to those remedies which had in view the restoration of exhausted soils and the regeneration of the constitutions of cultivated vines.

I found that the weight of evidence was in favor of the use of nitrogenous potash manures and of American vines, as near to the wild state as possible, for grafting stock. All specifics, to be used as simple insecticides, were found to be impracticable on account of great expense and their failures to provide radical and permanent cures.

The only permanent resistance was found where constitutional changes were wrought in vineyards.

Many French viticulturists and scientists adhered to and insisted upon the theory that the resistance of the American plants was solely due to the peculiar constitutional structure of their roots, being impervious to the attacks of the insect and that there could be no regeneration of European vines which would enable them to resist the plague. Some, however, with apparently good reasons, ascribed the rapid progress of the dis-

ease to the impaired constitutions of European vines, increased by over-production and the impoverishment of soils; these held the opinion that the American vines resisted because they were pure stocks, not worn out by excessive and vicious cultivation. These latter also thought that the European vine might be restored to a better degree of constitutional vigor through regeneration from the seed, which would cause the plague to disappear. It was necessary, therefore, to consider the phylloxera as an ordinary parasite developed into an epidemic by conditions favoring the spread of disease. Whether this were true, or not, the fact remained that the addition of potash to soils from which it had been exhausted retarded the progress of the insect in destroying vines, and that the substitution of certain American vines for the European varieties completely stayed the evil. The American vines experimented with were numerous in name, but it must be remembered that they have all been produced from a few original wild varieties, either improved by simple processes of reproduction, or hybridization. It was observed that the pure varieties were able to resist the insect (with some doubt concerning

the *labruscas*), and that the hybrids generally failed. The varieties considered sure were of the *cordifolia*, *riparia* and *estivalis* types. No experiments had been made with the wild vines of California or Arizona (*vitis Californica* and *vitis Arizonica*).

I recommended then that our viticulturists should at once try the virtues of the wild vine of this State, which resembles somewhat the *riparia*. I called attention to a new proposition, viz: the use of seedling wild vines for grafting purposes in place of cuttings. This reform in grape culture, which if successful would cause each vine to have roots constitutionally perfect in all their parts with the undiminished vigor of an original plant, I thought to be based upon sound principles everywhere recognized in horticulture. It occurred to me that if cuttings were good to graft upon, seedlings, well selected, would be better, because their vitality would be unimpaired and their root system complete.

This idea has been criticised by many, upon first hearing it, because experience in raising seedlings had shown that in many cases they were inferior in strength to their parents. This however was answered at once by saying that the failures were probably almost wholly due to the fact that only the seeds of improved, or hybridized varieties had been experimented with. Such varieties not only generally fail to reproduce themselves through seedlings, but also fail to produce vigorous offspring. The experiment of reproducing simple, pure varieties, unaffected by crossed saps and high cultivation, had seldom if ever been tried, because the aim had been, in the past, when raising seedling grapes, to procure either new varieties by hybridization, or the reproduction of such as had already been hybridized. Seedlings had therefore generally shown constitutional weakness.

I feel quite safe in relying upon the general law of nature that propagation from the seed produces natural and healthful growth, and that each produces after its own kind, unless simple reproduction has suffered some violence rendering seeds unreliable.

There might however be some doubt as to the vigor or rapidity of the growth of a seedling wild vine, as compared with a cutting; but I found that in France seedlings produced wood as rapidly in most cases, and sometimes more rapidly than cuttings. I was hopeful also of the California vine, and determined to conduct some experiments. I shall now offer to our viticulturists all that I have been able to learn on the subject.

RESISTANCE TO THE PHYLLOXERA.

I can find no reason to suppose that our indigenous vine will not resist phylloxera

equally as well as the vines of Missouri, Ohio, the Carolinas and Texas. I do find by examination of the Sonoma Valley that wild vines are flourishing in the midst of vineyards which have been destroyed by the pest. This proof is one that would be generally accepted as sufficient, but it is not by me for a reason which I will explain. I have ascertained that European varieties of vines in infected places are saved from the insect, if the soil near their roots is not disturbed by cultivation. Instances of this are the following: a roadway proves an obstacle to the advance of the plague and generally the vines next to the hard ground last longest; a vine in the rear of Mr. Attila Harazthy's residence in the Sonoma Valley, has survived, while the surrounding vineyard has been destroyed—the soil about it is tramped hard and compact and is not disturbed; old vineyards, abandoned, after being attacked severely by phylloxera, have become overgrown with weeds, the soil hardened, and resuscitation has been noted. It is probable that the insect cannot work in soils that are not thrown open to the air by cultivation, leaving crevices to follow and to enter and room for respiration. If this be true, the wild vine can only be fairly tested where the soil is cultivated and loosened. Sandy soils are preferable for vineyards; the phylloxera does not spread in them, probably because they do not, when loosened, leave passage-ways, such as clay soils do. However there is good reason to believe that our wild vine will resist the phylloxera; if so, I should prefer to use seedlings to graft upon. They may be produced in nurseries by the million, and at one year old an opportunity will be had for selecting only those of the most vigorous growth.

SELECTING SEEDS.

Last August I examined the wild vines which grow in the Sonoma Valley with the intention of having seeds collected there. I was not satisfied with what I found, for two reasons; because the berries appeared imperfect, and I was afraid they might have been impregnated from the surrounding vineyards. I intended to follow carefully the theory that hybridization renders seedlings constitutionally weak, and also that seeds from the most prolific vines, bearing perfect bunches of grapes, would germinate, with the best results.

By inquiry I learned that the wild vines in the vicinity of Harbin's Springs, in Lake County, were the most luxuriant, prolific and bore the best developed bunches of fruit. At that time, I assumed, as others do, that there was only one variety of wild vine in the State—the *vitis Californica*, first described

by Bentham, and that all I needed was to procure seeds from the best specimens to be found. I am now convinced of an error, for I am quite sure that the varieties of our wild vines are quite numerous, though to the casual observer they all appear alike.

I succeeded in engaging Mr. C. Mattier, an intelligent Frenchman, who lives a hermit's life in the valley adjacent to Harbins Springs, to collect seeds for me. I found that he had already commenced to experiment with the wild vine as I had recommended.

On the 7th of April, 1879, he had scattered broadcast in his vegetable garden an oyster-can full of the seeds of the wild vine which he had saved. He had expected only a few to germinate; but thousands soon appeared above ground, most of which he destroyed in cultivating his garden. On the 2d of June he transplanted a few, as he would have done with tomato plants. These he took care of and watered. In the month of October, at my request, he dug up two of these seedlings, less than seven months old from the seed, and sent them to me, together with branches of an old wild vine of the same kind, which were loaded with fruit.

One of the seedlings, together with average samples of the wild fruit, I photographed to preserve for the use which I make of them now. They are figures 2 and 3 on the accompanying plate. The seedling had developed a perfect system of roots, the longest being three feet and a half to the point where broken off in the deep soil. The wood of the stem just above the soil was three-eighths of an inch in diameter and the growth three feet high. Subsequently I had a collection of the seedlings, which had not been cultivated and had had no advantage of water, sent to me. Most of them were too small to graft, though some were quite well developed. It is probable that if the seeds had been sown earlier and well cultivated in favorable ground, a large percentage would have produced vigorous plants. Nothing could have been more satisfactory than Mr. Mattier's experiment, as far as it shows the vigor of these seedlings. Figure 2 in the accompanying plate represents the seedling photographed a little less than one half the natural size.

Mr. Mattier says that he had used the wild grapes to mix with the Mission and other cultivated varieties to produce claret wines, and that he had discovered remarkable vinous qualities in them similar to those of the best Bordeaux grapes. He found certain bunches among the vines growing near Harbin's Springs, which had accidentally developed in size and character to such a degree of perfection that he had conceived the idea of improving them by cultivation, not for grafting

stock, but for producing fruit for wine making. One bunch he had found measured eight inches in length, the berries being large and well matured. But of this feature I shall write further on when noticing the value of this vine on its own merits, independently of its value for grafting stock.

He collected for me three hundred and twenty-five pounds of seeds—including the dried skins. The method, according to my directions, was to select matured bunches, to crush the berries, without injuring the seeds, to press out the juice carefully by hand so as to prevent fermentation and to dry the remainder in a shady place.

He also conducted experiments in making wine from portions of the grapes, which first demonstrated that there were several varieties of these wild grapes.

There were noticeable different colors in these grapes when picked, but this had generally been attributed to different degrees of maturity. I have, however, sampled three different wines made from these grapes, which vary so much in general characteristics that I am convinced that they are the products of distinct varieties. One was of a light reddish brown color, another port like, another violet purple. The last had such an abundance of coloring matter that a small addition of it to a glass of white wine was sufficient to impart a brilliant claret color. When I submitted it to Mr. Arpad Haraszthy for his opinion he pronounced it, without hesitation, a fine claret wine, and remarked, "They will plant that vine yet in Bordeaux by the million!"

Mr. Mattier thinks he can distinguish five distinct varieties among the vines in his vicinity.

The seeds which I have, upon examination, disclose marked, distinctive peculiarities, notwithstanding a common type prevails among them. Some are grayish colored, some bright reddish, others dull coffee brown, with varying shades between these. The dark seeds, coming from the dark grapes, predominate. Some are also, no doubt, immature and worthless.

HOW TO USE THE SEEDS.

For the purpose of producing seedlings for grafting stock, I presume that there can be no material difference in the value of these seeds. All of them are from a district uncontaminated by a possible hybridization, excepting such as may have happened naturally among the wild vines in the state of nature. The vines from which they were gathered exhibit remarkable fecundity as well as luxuriance of growth. Some cover trees from fifty to seventy-five feet high, and produce at least one hundred and fifty

pounds of fruit each. It is to be expected that when these vines are cultivated and properly pruned, the fruit will improve.

The seeds may easily be germinated in light sandy loam, or any soil which would be suitable for nursery purposes. In order to obtain the complete value of perfect roots, the best method, no doubt, would be to start the seeds in boxes, or under glass, in February or March, in the same manner that tomato plants are raised; then as soon as the vigorous young plants can be determined, which would be within two months, to transplant them carefully into the vineyards where they are to remain. In this way the roots may be suffered to grow undisturbed and the plants may be grafted in place the next spring. In case some have failed to grow their places may be filled with seedlings one year old from the nursery and grafted at the same time. The seedling (fig. 2) shown in the accompanying plate, was carefully taken from the ground, six months and a half old. In ordinary work, most of its roots would have been shortened, and its perfection when transplanted would be impaired, although in any event it would be superior to a cutting.

In the most cases, however, it will be considered impracticable and as a process too slow to use the seedlings transplanted from boxes or hotbeds. Most farmers will prefer to obtain their plants of the one year's growth in nursery. They will have the advantage of selecting only the most vigorous growers, and can graft them before planting.

Common farmers' sense will indicate how to manage a nursery. I should say, sow the seeds in rows in loose, deep soil—moist, but well drained, after the manner of sowing carrot or beet seeds. If the plants come up irregularly a little labor can be profitably used in redistributing them by removing some from the crowded places to the spare spaces. If the rows are eighteen inches apart, and the plants from four to six inches apart in the rows, about sixty thousand may be raised on one acre. At the end of one year, if all are not required for transplanting, the alternate rows may be taken up, leaving ample room for cultivation.

HOW MANY SEEDLINGS MAY BE REQUIRED.

It is the practice in this State to plant vines about one thousand to the acre. Forty acres would require forty thousand plants. In the Sonoma valley six hundred acres have been destroyed by phylloxera; it would require six hundred thousand plants to replace them. Thousands of new acres are to be planted in Sonoma, Napa and other counties. To ensure them against the future attacks of the dreaded plague, prudence would advise viticulturists to put a foundation of sound

and perfect roots under their vines. It is plain to see that if this principle of using wild vine seedlings prevails, millions of plants will be required and that there is no danger lest nurseries should become overstocked. As soon as the experiments have progressed two or three years, and we have found out what the French have discovered already, it will probably be impossible for the few who have had the foresight to plant seeds to supply the demand for seedlings.

No doubt, a market may be found in France for millions of plants from this State. They have now *three billion* destroyed and sick vines to replace.

A nursery cultivated for three or four years would also furnish an abundance of cuttings, if required, in preference to seedlings, which could be more profitably obtained in that way than by seeking them at the tops of great trees in the wild state. It would be a great task to obtain 100,000 cuttings from the wild vines, while they might be easily taken from a quarter of an acre of three year old vines in nursery.

I have counted small lots of the seeds which I have, and find that they average about 8,000 to the pound, the crushed and dried skins remaining among them. The whole lot collected for me contains about 2,500,000 seeds. I should expect to waste at least one-half the seeds in sowing them, because many of them stick together, glued to the skins, and, under any ordinary circumstances, they would fall unequally in sowing. A great many plants would require to be thinned out and destroyed. The immature seeds would not germinate. I should estimate, therefore, that twenty pounds would be needed for an acre nursery. If started first in boxes, or hot beds, they might nearly all be saved in transplanting, and one half the seeds would suffice. I should think that even when starting a nursery, it might be best to sow first under glass and transplant only the most vigorous, as soon as they are developed sufficiently.

WHAT WILL BE DONE THIS YEAR.

I have already distributed portions of the seeds collected to Mr. Chas. Kohler, of Sonoma; Mr. G. Groezinger, of the Napa Valley; Prof. Hilgard, of the State University, and Mr. John L. Beard, of Centerville, one of the Regents of the University, and a skillful farmer.

About an acre will be cultivated in seedlings at Berkeley. Mr. Beard will do as much and more to provide for his and my personal use next year.

The question of expense has not troubled me in this matter, because I deem this reform of such vast importance to the future of our

vineyards that I am only anxious to have the experiments started as extensively as possible, so that there may be a large number of plants for sale or distribution, as soon as our farmers have become satisfied with the soundness of the theory advanced.

I have therefore put up one hundred half pound and fifty pound packages for distribution to whomsoever will demand them in this State, and Mr. A. D. Bell, the proprietor of the MERCHANT has kindly agreed to distribute them for me. I feel no hesitation in appealing to our intelligent viticulturists and farmers to assist me in making these experiments as general as possible, and in asking those who are willing to do so to write to Mr. Bell for seeds. I only ask that the seeds may not be wasted and that next fall all parties having germinated them will notify the President of the State Viticultural Society—Mr. Arpad Hararthy, or his successor in office—stating what results they have obtained, kind of soil in which plants are growing, and what disposition they desire or intend to make of the seedlings they have, so that, if offered for sale or distribution, those desiring them may know where they may be obtained.

I shall send some to France to the Viticultural Union of the Entre-Deux-Mers, where they have been desired, and some to the Agricultural College at Montpellier, in the Department of the Herault, where more than two hundred varieties of American vines are now growing.

DESCRIPTION OF THE ACCOMPANYING PLATE.

In order to illustrate the different principles of propagating vines, I have prepared the accompanying plate, lithographed by Edward Bosqui & Co., the explanation of which is as follows:

Figure 1. Seed of the California wild vine from Harbin's Springs, magnified six times.

Figure 2. California wild vine seedling, nearly one-half natural size; seed sown April 7th, 1879, near Harbin's Springs by Mr. C. Mattier, transplanted June 2, and taken up finally as shown in figure, in October, being then less than seven months from the seed. It shows the system of roots peculiar to a seedling, and the leaf peculiar to the *vitis Californica*. The vigor of the plant cannot fail to attract attention. If Lake County can produce this much what may not more favorable places do?

Figure 3. Bunches of wild grapes from old vines at the same place, nearly one-half natural size. Perfectly matured; very dark or shining black; taste agreeable acid; no trace of any flavor similar to wild grapes of States east of the Rocky Mountains.

Similar in vinous qualities to the grapes of the Medoc, which produce the most famous clarets.

Figure 4. Illustration of roots developed from a foreign cutting two years old—copied from a French work. It shows that cuttings produce only lateral systems of roots and exhibits an inherent weakness by reason of the lack of a constitutionally perfect root system. The main trunk of the root is a portion of wood grown above ground, which never partakes of a true root's character. It may be liable to disease, and, if affected by worms, or rot, between the upper and lower lateral roots the lower system must necessarily be cut off from the plant above. The destruction of any one of the seedling roots, however, need not affect the others, which all tend to strike deep into the soil.

Figure 5. Illustration of a short section of a cutting, full size, with only one bud, intended to be planted in the manner of a seed. This method of propagation has been experimented with, but has not obtained any general use.

Figure 6. Illustrates the development of a bud cutting, one year old planted after the manner of figure 5, at the College at Montpellier. It is copied one-sixth natural size and shows that the roots thrown down are similar to those of a seedling. The French call it *bouture semis* (cutting-seedling). In this particular case, the root was thrown down fifty-four inches and the wood made above ground was thirty-seven inches.

The superiority of the roots of the seedling must be manifest to even a casual observer. I believe that most, if not all the diseases pertaining to the roots of vines are owing to the vicious practice of propagating the same vine for centuries by cuttings only. Their roots are constitutionally defective and weak.

THE WILD GRAPE AS A WINE GRAPE.

I think there can be no doubt of the value of our native wild vine for grafting stock and for this purpose I do not hesitate to recommend its general use, either by cuttings, or seedlings. But the experiments made for me by Mr. Mattier during the past grape season, have convinced me, as well as others who are experts, that the crowning virtue of this vine is its value for making claret wines. I should not hesitate, if I had a vineyard to plant in any of our northern, or central counties, to cultivate this vine for the sake of its fruit. I believe it will supply the greatest desideratum in our wine making and is destined in the future to make the clarets of this State famous. It produces tannin and tartrate of potash, has no striking aroma, is sufficiently neutral and has no disagreeable taste whatever. The viticulturist who plants