Sydney Morning Herald 14 June 1890 page 5

**GRAPEVINE LOUSE (PHYLLOXERA VASTATRIX)**

The attacks of this destructive insect were first noticed as a ' vine disease ' in 1868, in the South of France, and in the vine-houses near London. In France it spread rapidly, especially in Vaucluse, reducing the yield of wine in that department in 1870 to about one tenth of its former quantity. Thence it appears to have spread northerly, and to other European countries, Hungary suffering most severely. Reports soon came from America that the dreaded insect had been discovered there, and as we all know too well, we had not long to wait for the appearance of the pest in Australia. Geelong claims the notoriety of having first possessed an extensive settlement of the true insect, and to the credit of the Victorians, be it said, they quickly set to work to eradicate it. That this was not easily accomplished we have ample evidence, considering it is about 10 years ago when measures were first initiated, and that several years afterwards the ground was upturned, the vines, leaves, twigs, and all the roots that could be found were burnt in addition to which the soil was treated with powerful chemicals, yet, notwithstanding all this vigorous treatment, the insects were discovered in numbers close to the surface of the soil, attached to-and feeding on portions of roots that had escaped notice at the time. The roots of grapevines will exist green in the soil when severed from the plant for many years.

About six years ago the insect was first discovered in this colony thoroughly established in the vineries in the Camden district. The unwelcome news, we believe, was at once brought under the notice of the Government and the seriousness of the discovery explained, and the Government was urged to take immediate steps to eradicate the pest. Unfortunately, the advice does not appear to have been considered important, the gravity of the case evidently not having been understood, and the proprietor of the diseased vines in question was permitted to adopt whatever course was thought best, which may or may not have been the most effective means of utterly destroying the insect. However, it is pleasing to know that measures were taken by the proprietor to rid the vines of the disease, which, proving futile, they were uprooted, and the same ground planted with the orange. It is doubtful whether this should have been permitted. A most serious mistake was made by the Government in not following the practice adopted by other countries under similar circumstances, of quarantining the vinery and its immediate neighbourhood, instead of which, free scope was given the insect to distribute itself far and wide. That it has spread there can be no doubt for it has already been discovered at Seven Hills and probably in other districts but unrepeated or it may be in existence in many places, though unknown. The sooner we realise the mighty consequences this tiny insect is responsible for, the more readily should set to work so as to be in a position to defend our vines from their devastating attacks. Hear what Hubert De Castella, the well-known vigneron of Victoria, has to say on this important aspect of the question: -

[extract from a paper read by that gentleman at a meeting of the Royal Colonial Institute, London, June 12, 1888]

*“On the subject of the phylloxera I will not fatigue you with statistics, which have often been presented to you in other places. To indicate its importance, it is sufficient to repeat that two million acres of vines have been more or less been destroyed by that insect in France; that, in 1884, 400 million sterling were computed to have been lost to her public estate, and that from 1885 to 1887, 152 million sterling have been disbursed by her for foreign wines and dried grapes.*

*Before such figures it is not surprising that France, with the energy of despair, should set to work to reconstitute her vineyards. Three different methods are resorted to in order to cope with the pest, viz. (i) submersion, (ii) the application of insecticides-bisulphide of carbon being injected into the ground and (iii) the introduction of American varieties. The first method, only possible in low-lying lands, protects about 60,000 acres of vines. The second, of too expensive a nature to be used except where the worth of the vine justifies its cost, defends about 170,000 acres. The third method, the most practical, namely the substitution of the numerous species of the American vitis for the vitis vinifera, which was the only species hitherto cultivated in Europe, has been applied to 400,000 acres.*

*But France is not the only country where the fight against phylloxera is taking place. All are invaded, and all are preparing for their defense. Everywhere the introduction of American vines seems to be in the ascendant. In Hungary, where, if we can rely upon a French report just published, out of a total area of 1,000,000 acres of vines, 300,000 acres either have been already destroyed or are dying from the effects of the phylloxera. The Hungarian Administration distributes to her vignerons 2,000,000 cuttings of riparias, salonis, and Jacquez [also known as Lenoir] imported from the south of France, besides the American plants furnished by her eleven State nurseries. Italy, Spain and even Turkey are propagating the American sorts. It is important that Australian vignerons should calmly consider the question, and not neglect any opportunity of mitigating a disaster, if it is to come upon them and at the same time avoid rushing into hardships and expenses in view of an evil which they might altogether escape."*

The above information and advice should be taken to heart by our Government, and heroin lies a valuable work for our new Department of Agriculture. The Minister for Education has taken up the wattle question in a practical way. That energetic Minister no sooner conceives a thing than, being assured of its advisability, puts it into practice. May we hope that the Minister for Mines and Agriculture will take up this question of vines and its diseases also in a practical and liberal spirit, together with other similar subjects, such as the codling moth, rust in wheat, orange scab, etc. It is no use offering inducements to farmers, orchardists and others to conduct experiments, these must be undertaken by the Department, and the country must bear the expense for the general good. If experimental stations were established in different parts of the colony, the various varieties of the wild American vines, especially Vitis riparia, and even our own native vines, could receive a thorough test in regard to their value as a disease-resisting stock, or of their capability of improvement by cultivation. The department, through these stations, could also undertake the raising of great quantities of young plants for distribution of those varieties proved to be resistant for stocks upon which the famed European varieties could be budded or grafted, and thus in some measure we should be prepared to deal with the pest whenever it may attack us in a wholesale manner.

**LIFE-HISTORY OF PHYLLOXERA VASTATRIX**

Many voluminous life-histories of the phylloxera have been published, but that given below, it is thought, will serve the purposes of the present publication.

This insect belongs to the aphides, or green flies, a group that contains many species very destructive to field and garden crops, but none which approaches this in the injuries done by it. The insect lives principally on the European vine (Vitis vinifera), forming galls on both roots and leaves, and when it has once affected a settlement, the plant, if left to itself, soon perishes under the attacks. The injuries to the leaves are of comparatively slight moment; the danger proceeds from the effects produced on the young roots. The insects frequently affix themselves near the tips of newly-formed roots, and push their proboscis through the bark, it may be even to the cambium. There results from this a thickening of the bark; due to the development of new cells-hence the formation of galls, some of which reach the size of a pea; and after a time, the central part of the root also becomes modified. In autumn, the healthy young roots begin to undergo enlargement to form the older ones of the next year; but in those affected, the galls die and the roots also perish. The plants are thus deprived of due nourishment and are starved, while, at the same time, they are weakened by the abstraction of food by the insects on the older roots and leaves. Phylloxera vastatrix passes the winter on the roots. ln spring the plants push out young branches and leaves, but these soon become yellow, and wither, and the fruit if they ripen, often remains uncoloured and sour. The next year the leaves are still more deformed, and fruits are either not formed or do not ripen. The insects leave the vines before the latter are quite dead, and crawl about in search of new plants. Hence any diseased plant is a dangerous centre of infection in any vinery. The insects vary in appearance. Eggs laid in the autumn between the crevices of the bark on the roots, produce in spring, larvae which pass with little change, except more increase in size, into mature females. These larvae usually form galls on the leaves, but at times the leaves alone are attacked. The leaf galls form small reddish warts on the one side of the leaf, with small depressions on the other surface. In this depression is the entrance to the gall-a slit closed with hairs. From the leaf-galls emerge wingless insects, which continue for a time to form new galls, and at last pass down to the roots. The mature female may reach 1/30 inches in length and varies in colour from pale yellow to dull brown. The males become winged when matured, the body about 1/40 inches or 1/50 inches long, the wings are nearly twice as long aa the body. The colour is golden yellow or approaches dull orange, except a dark band across the thorax. The eyes are red in both sexes. The formation of the insect is not distinguishable without the aid of a magnifying glass. Professor T. Kirk, F.L.S., of Wellington, New Zealand, writes, in reference to the life-history of Phylloxera vastatrix. In Europe, the subterranean form effects the greater amount of injury, in America the aerial forms are dreaded most. The winged aerial female is developed from a true egg deposited the previous autumn, and is about 0.070 of an inch in length, flask-shaped, and contains numerous pseudova; the suctorial beak is about one-fourth the length of the body. She becomes the mother of the colony and punctures the leaf in such a way as to cause an increased flow of sap to the wounded parts, resulting in an unhealthy growth, which grows a gall completely surrounding the insect. In this gall she deposits many hundreds of egg-like bodies during the summer months. After the larvae have developed they descend to the roots in such vast numbers as to give the fibres the appearance of having been dusted with flour. The bark of the root decays and falls away, while small knots or galls are formed on the fibres. The affected vines at this stage present an unhealthy, stunted appearance. The wingless subterranean female is only 0.026 of an inch in length, and her body contains but few eggs. She produces five or six generations; so that larvae of various sizes and different forms are found on the same root. Shortly after midsummer many of her progeny develop wings and ascend to the surface; when they migrate to other districts, where they produce true males and females, the latter being more numerous than the former. In this condition they are about 0.120 of an inch in length; each contains a single egg, about 0.015 of an inch long, which will give rise to the true male or female, the egg from which the last is developed being larger than that which gives rise to the male. Pseudova, capable of producing true males and females may, however, be produced by wingless forms also. The true male is smaller than the female. Both alike are destitute of a mouth and exist for reproductive purposes alone. Both male and female are wingless. On the fourth day after the female is hatched she deposits a single egg in the crevice of the bark, where it remains during the winter. The winged forms are unable to cross extensive plains or seas, but the true ovum retains its vitality for a considerable period and may readily be transported. The subterranean larval forms may easily be carried from one country to another on the roots of infested plants.

From the foregoing it would appear that there are many forms of phylloxera destructive to the *vitis* family, and that they differ materially in different countries and under varying circumstances. It therefore behoves us to prosecute inquiries and conduct experiments on our own account, both in regard to the several diseases that attack our vines and fruits, and the vines and fruits themselves. It is sheer folly to depend entirely upon the teachings offered us by other countries, because that which may prove a complete remedy in Europe or America may be useless in those colonies. Of course, private individuals cannot undertake costly experiments. These should be carried out by the Government for the benefit of all; and in connection with this, inspectors should be appointed whose duty it would be to visit and examine every vinery, large and small, in the colony, and promptly report any discovery of a dangerous disease, with a view to its receiving immediate attention.

**REMEDIES**

The remedies recommended are numerous, but there is only one sure means known at present of eradication, namely, by uprooting the vines. The German law of the 6 March 1875, enforces the complete uprooting of all infected plants, burning every part, and a disinfection of the soil by carbon bisulphide. This chemical, it is said, destroys the insect on the roots, but does not injure the plants, especially if applied in the winter. In many countries, Germany in particular, no plants that are likely to introduce the disease are allowed to be imported, and stringent means are taken to give effect to the law. In New South Wales, vines and vine-cuttings are not permitted to be imported from Victoria, while, singular to state, the vignerons and fruit growers of the latter colony are making combined representations to their Government, with a view of preventing the importation of not only vines, but all plants from New South Wales, on account of phylloxera existing in this colony.

The diseased vines in the Geelong district, Victoria, were uprooted by the Government, and the owners compensated at a cost to the country of about ₤40,000. A broad area of country surrounding the contaminated spot was reserved from cultivation. The work of eradication was conducted on similar lines to those adopted by the Vines Diseases Board of this colony. It will be remembered that after the lapse of several years, an examination was made of the soil at Geelong that had been treated, as was thought, so effectively, but, as previously mentioned, the insects were discovered in numbers on the remains of roots that had been accidentally left in the ground.

The various chemicals recommended for destroying the insects have not hitherto proved very effective; an application sufficiently powerful to accomplish that, invariably injures the vine beyond recovery. Bisulphide of carbon has proved one of the best; it is introduced into the soil by an injector of a special construction, or through porous substances saturated with the chemical, which costs about £4 per acre annually. Sulpho-carbonate of potassium is perhaps more effective, and less harmful to the vines, but considerably more expensive. Sand is also recommended to be dug in round the roots; but as a matter of fact, that was done at Camden; bisulphide of carbon was also tried, but to no purpose. This sand remedy has been suggested from the fact that vines growing in sandy soil appear to be exempt from the insects, and this was found to be the case at those Camden vineyards planted on a sandy soil. A very recent discovery of a remedy was reported in the Sydney Mail of June 7, 1890, which consisted of a preparation of sulpho-potassium: a full description of its preparation and application is supplied in the above journal of the date given. Notwithstanding all these so-called perfect cures, we think our attention should be directed more particularly to a means of prevention, which we think will certainly be found in adopting the hardy, wild American *vitis* for stocks upon which the famed but more delicate European varieties could be budded or grafted. The cost of applying any chemical to the soil in such a way as would utterly destroy the insects at their greatest depths, and that would follow every rootlet to its extremity, at the same time prove perfectly harmless to the roots, it is thought, would be so great as to result in grapegrowing becoming unremunerative. For should a first application even succeed in destroying the pest, it would not prevent a revisitation of the insect after a lapse of a few months. Evidences of the value of American varieties of vitis as stocks are reaching us from all parts of the world; and no wonder. Several of the varieties, notably Vitis riparia, V. Lenoir, V. salonis, Clinton, Taylor, are known to be of a very hardy habit and powerful growth, will in fact, flourish almost anywhere, sending down their roots from 12 to 15 ft, below the surface, which is far beyond the reach of phylloxera. Of course, some of their roots would remain near the surface, and these would be subject to attack, but that would only result in a partial injury. Moreover, it has been discovered that the bark of the roots of these varieties is very tough and cannot be easily pierced by the beak of the insect. These are the conclusions come to by science, and happily they are endorsed by practice. The American varieties have been seen growing luxuriantly in France surrounded by European sorts dead and dying from the disease, and an examination has proved that their roots were swarming with the insects, but with apparently no injurious results. The American vine, it is said, is primarily responsible for the introduction of Phylloxera vastatrix as a vine disease; not that it is the cause of the insect’s spontaneous birth, but that it in some way follows that vine, and when brought in contact with the European varieties leaves the American for the latter, which it quickly kills. We should feel inclined to ridicule this aspect of the question that the American grape is responsible for the pest but for the fact that a man of Hubert de Castella’s stamp and intelligence has supported such a theory; fortunately, it is only a theory and is one of those things which seem incapable of proof.

Some useful lessons may be learned, bearing upon the question of disease preventatives, if the different systems of pruning are examined, as practiced in other lands.

Phylloxera vastatrix, as most other diseases, attack the weak first, hence it follows that the vineyard established on good soil, which is kept in a state of good cultivation, and the vines well cared for in every way, would be in a stronger condition to withstand or repel attacks. It has been stated herein that the disease first appeared in France, and it further appears that the greatest amount of injury was inflicted upon those vines that had for a great many years been subjected to what is known as "pruning hard back," and growing them gooseberry bush form. The grapevine by nature loves to climb and ramble, and if this vigorous habit is incessantly checked the plant will surely though slowly suffer. That there are grounds for these views is evidenced from the fact that at the time phylloxera was raging in France, Hungary, and other countries, the vines of Italy, Portugal, and parts of Spain, that were allowed to climb over pollarded trees, and that were trained upon trellises, escaped almost entirely from injury. We have not far to seek the cause of this exemption, these climbers grow vigorously, send their roots far down into the soil, and bear masses of foliage and fruit. Many vignerons prune and pinch back their vines so much, that but little foliage is formed, and yet it is expected that those vines so shorn, should always grow healthily. The arguments in favour of the bush’s fashion are, that cultivation is more easily conducted, the fruit more quickly gathered, and that it is of a superior quality, especially for wine purposes, that on a given area, the fruit is in greater abundance, and that altogether the whole thing is more easily manipulated. These views are very much open to doubt, and we think are due more to the inexpensive method of first planting. Fortunately, the views advanced above in favour of permitting more wood and foliage to grow upon the vines, are at last beginning to dawn upon the good sense of a great many of the vignerons of Victoria, and when this agreement to nature's requirements universally prevails, there probably will be heard less of the diseases that now trouble the vine.

**RESISTANT STOCKS TO GRAFT UPON**

Some twenty varieties or more are recommended for this purpose by as many authorities, but there appears to be a consensus of opinion in favour of two or three, or five at most. Professor Planchon places the varieties in the following order of merit: Vitis, Salonis, Clinton Vialla or Franklin, wild Vitis riparia, Taylor, Clinton. It is said, that the seedlings of Vitis salonis retain the characteristics of the parent plant, which the others do not. The varieties principally used in America are Vitis riparia, and Lenoir. The Lenoir is a very vigorous grower on dry hillsides as well as in flats but does not flourish where the subsoil is of a clay or hard, unyielding nature, whereas the Riparia thrives well in soils of the last mentioned character, and also in the richer valley lands. These two last varieties have additional recommendations to offer- the grafts or buds take readily (a serious obstacle with some kinds), they have been proved to be resistant against phylloxera, the cuttings strike quickly and surely, grow rapidly and root deeply. These are all important advantages in grapegrowing, Vitis riparia produces rather thin wood, hence it does not make a suitable stock upon which to graft stout scions. Vitis Lenoir would be better for scions of that character. It may be added that Riparia and Lenoir are the two varieties almost universally adopted as stocks in California.

It may be objected that were our vignerons to commence the importation of cuttings of the above sorts (of course by Government permission), it may be the means of introducing the phylloxera; but there is no need to do anything of the kind. This matter comes purely within the scope of our agricultural department. Were the department to import quantities of the seeds of the varieties named through the proper authorities and distribute them as may be determined upon, all fear of such a calamity would be avoided, for, of course, the insect does not inhabit the seed. All that is necessary is to keep the seed moist. The department might go a step further by raising the plants for distribution at a merely nominal sum. As a matter of fact, many of the American varieties are already growing here, and the fruit annually sent to market. The kinds referred to are Isabella, Catawba, Lenoir, Delaware, and others. The fruits of these vines are not in high favour, nor yet do they make superior wines, but many growers are using them for stocks, of which they speak in the highest terms.

The variety we really need that would serve for all purposes should possess the hardy and resistant properties of the American, together with the valuable qualities of the European varieties, both for table and wine requirements. Herein lies plenty of room for the experimentor, ample scope for the hybridiser; he who can produce a variety answering the above description will confer an invaluable boon upon all mankind and earn untold wealth.

Under the Vine Diseases Act of 1886, and the Vine Diseases Amendment Act of 1888, a board has been created, which has power to enter any vineyard, and to destroy any vines which may be found infected.