Influence of the graft on vine decline

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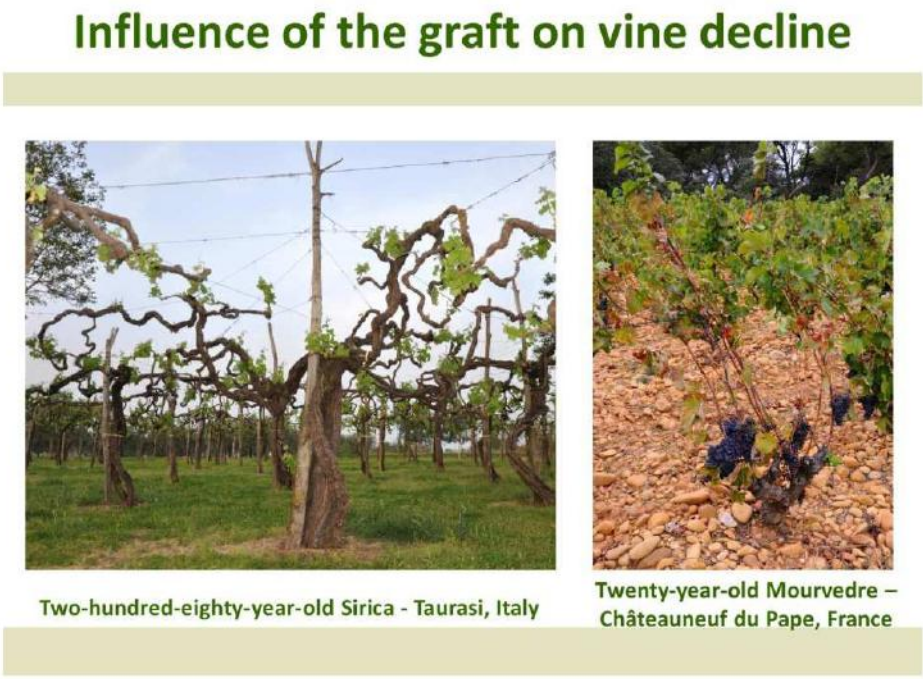
Manual grafted vineyard in Bandol

INTRODUCTION

Worldwide vineyards, represented by Marc and Caroline Birebent, is an organization which offers consultancy and services in viticulture and which specializes in grafting vines.

We have no formal scientific training, but we do have extensive practical experience, gained since the company started in 1985. The lack of formal qualifications is a handicap because we have no credibility with the professional scientific « community ». But it is also a great strength because we are not prejudiced by preconceived ideas, which allows us to reason based on empiricism.



Today, our oldest grafts are 30 years old, and for the last 15 years we have been questioning the official theories on vine decline, in its general sense.

We started by examining the problems with Syrah - problems called Syrah decline. In our opinion this decline is due to a combination of factors - that is, fragile clones plus the element of trauma, the first and most important being a poor quality graft. We note that this problem may also affect other grape varieties, such as Vermentino or Centennial.

The observations and findings we made led us to consider a more general problem of contemporary viticulture : the decline of the vine due to wood fungi, and particularly ESCA (which is a generic name), which is accused in Europe today of being the primary cause of premature mortality in vines.

We believe that the various fungi which are incriminated are only indirectly responsible for the death of the vines, which die from a vascular accident, a stroke. And we believe that the quality of the graft is the most important element, which explains the contemporary outbreak of wood diseases attributed to Esca.

We will present surveys and experiments that led to this analysis, hoping to encourage you, as researchers, to look closely at these neglected aspects of vine plants, namely the quality of Vitis vinifera grafts on to rootstock.

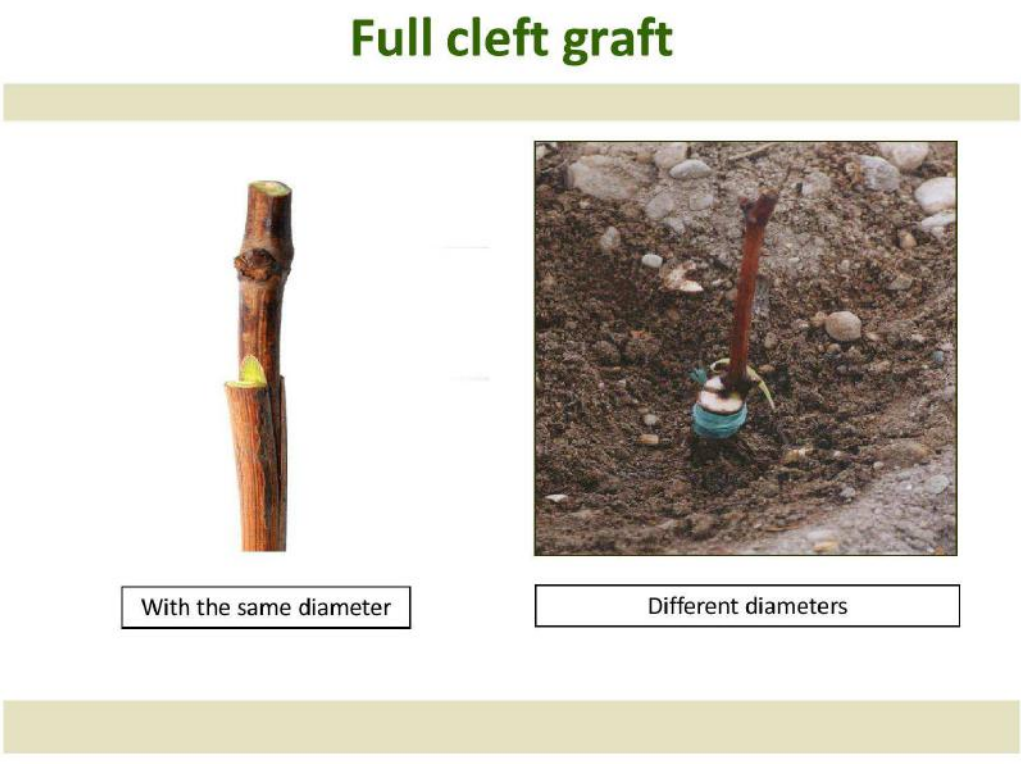
I'm going to present three surveys from different grafting procedures, in relation to the levels of expression of ESCA, to establish a parallel with the quality of grafting. The procedures are : grafting in its strictest sense, regrafting and top-grafting. These surveys were carried out with 5 susceptible varieties, over 50 plots, involving more than 38000 thousand vines. As you will see, the results are strongly convincing, and suggest to us a different way of thinking about these problems.

1) Grafting

When we say 'grafting', we mean taking a scion, usually of Vitis vinifera, and joining it to a variety of rootstock which has been chosen for a main reason, its resistance to phylloxera.

We identified the levels of expression of Esca as a function of the method of vine production. The different methods are :

a) the mechanical graft ‘omega’, done by the nursery, which now accounts for almost all planted vines,



b) manual grafts, those made by cleft in the same way as our grandparents

and the Whip and Tongue graft, and finally

c) bud grafting, as Chip-bud and T-bud, an ancestral technique which we are happily helping to reintroduce.

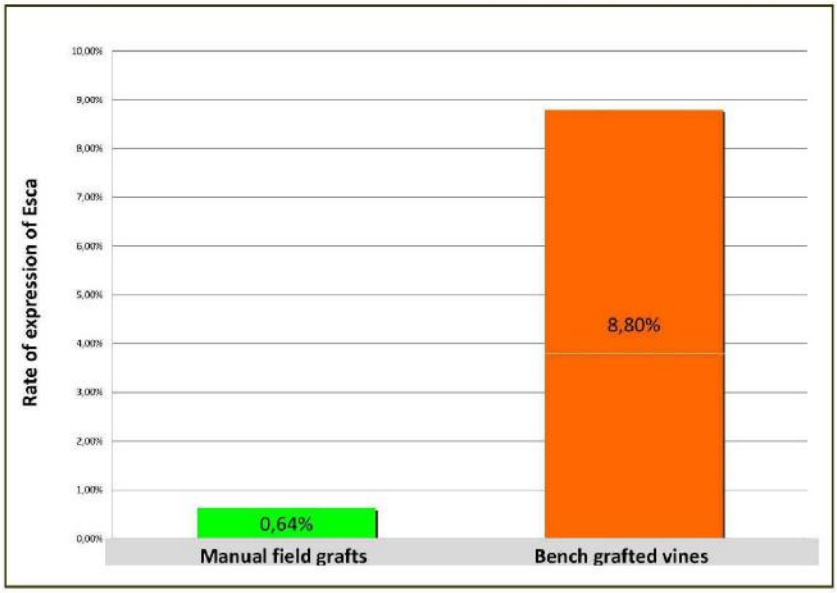
Field grafting onto rootstocks

We studied varieties which are very susceptible to Esca, such as Cabernet Sauvignon in Bordeaux, or Mourvèdre, in south-eastern France, in the vineyards of Provence, between Chateauneuf-du-Pape and Bandol.

The results are compelling since we identified an expression of Esca ten times greater on the vines from mechanical grafting than from manual.

Esca : Comparison Manual field Grafts / Plantation of Bench grafted vines

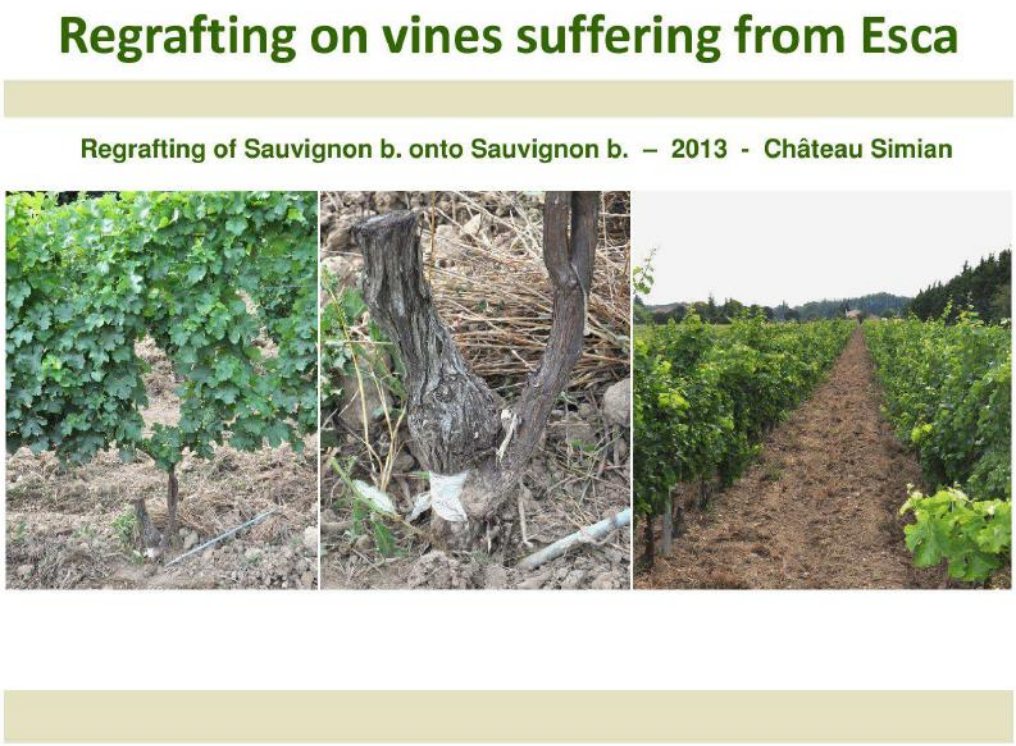
Study 2013/2014 — Average Rates of expression of Esca



There may be differences in the expression of esca in vines from omega grafts, but in over 15 surveyed plots not a single manual graft has been found which contradicts that finding.

That is why we think that rather than the grafting technique itself, it is the quality of the graft which is the issue. And it seems obvious to us that manual labor allows a level of calibration and quality of adjustment that a machine can't reproduce.

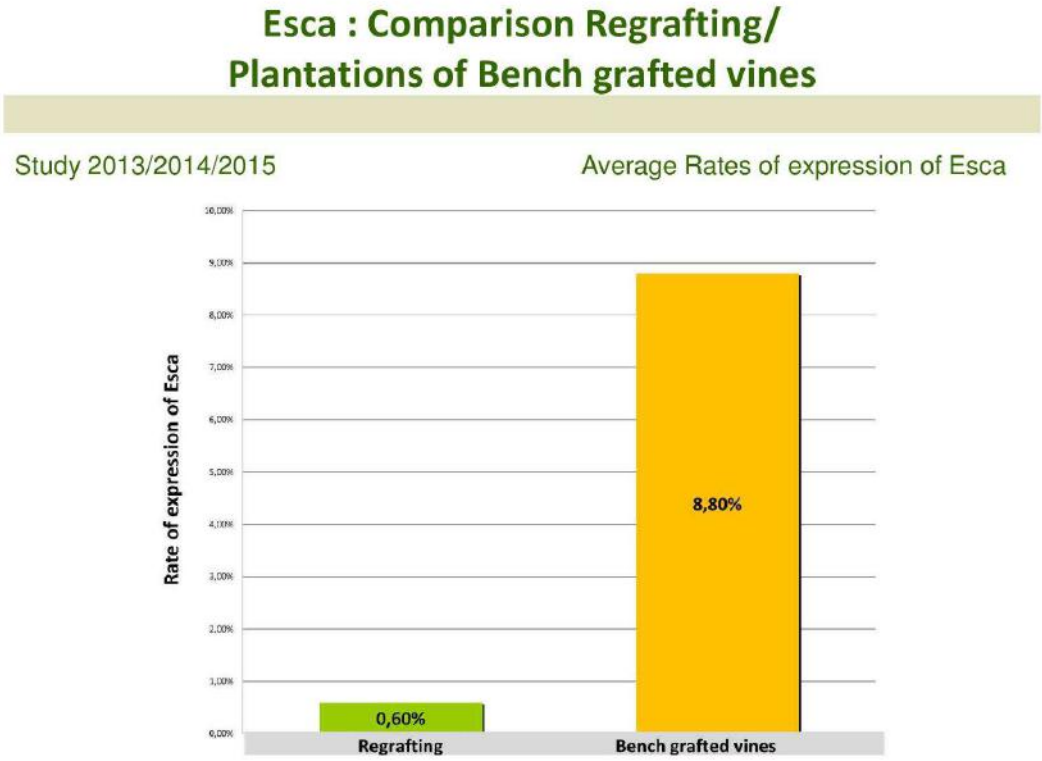
2) Regrafting



Our definition of regrafting is to insert the scion directly on to the rootstock, underneath the nursery's omega grafting point. as far as we are concerned we regraft using the Chip or T-bud method.

We have done this for years on many individual vines suffering from Esca. But these cases are difficult to manage due to weakened plants, competition from neighboring stems, fragility during tillage operations and so on Also data from individual plants are difficult to use scientifically. For these reasons, since 2013 we have also regrafted full rows.

Here again, fragile varieties were tested (white Sauvignon, Cinsault and Cabernet Sauvignon).



There is an interesting trend already. Before regrafting, the plots showed a level of 8 – 9% Esca. The regrafted plots showed a level of 0.60% . A ten-fold reduction.

These trials deserve to be heard and to be observed for a longer term before a final decision can be reached, and engage the wine-growing sector.

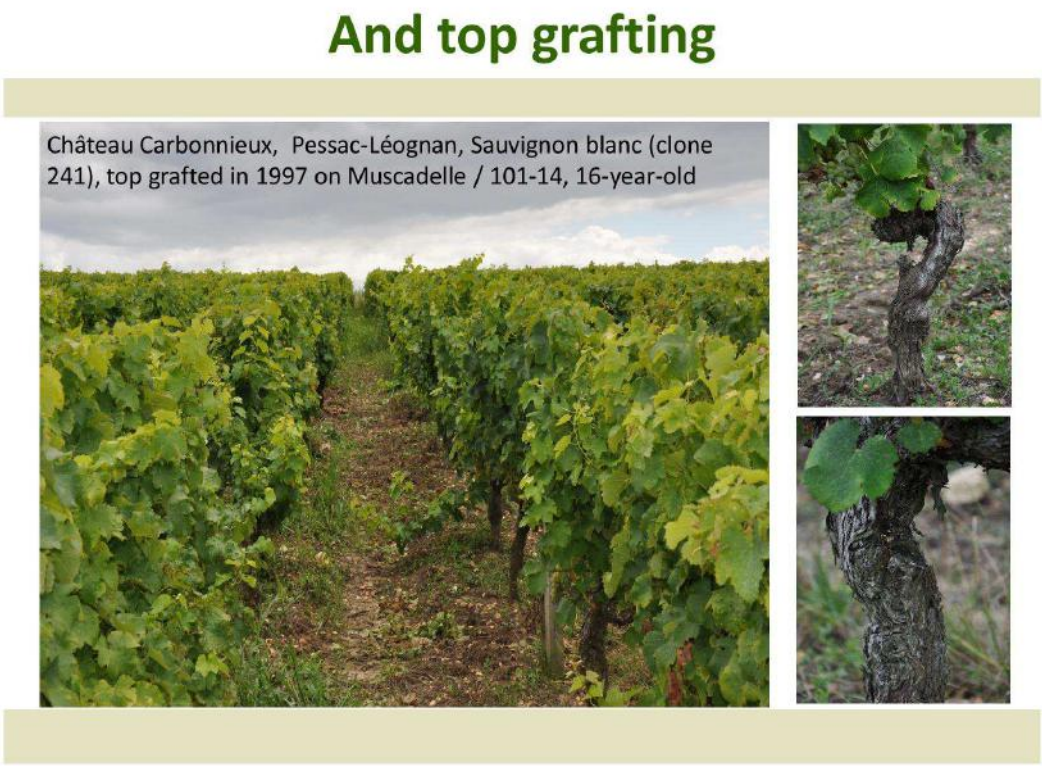
On the question of regrafting, however, we want to distinguish ourselves from the other speakers, as confusion is increasingly common.

Today, we carry out regrafting on to rootstock to discover the origin of the plague. We believe the origin is the mechanical graft. For the moment though, we don't want to promote regrafting as the solution to Esca, as more time is required for a thorough evaluation. We still want to observe the regrafting done on several vineyards for a few years, to see how they will behave.

We always talk about "quality of grafting", because a graft can be done well by machine, and badly done by hand. And although cleft grafting techniques can be advantageous on young rootstocks, we have serious reservations about the use of these techniques on older stocks. In our opinion they are too brutal, and often cause serious necrosis, which we want to avoid. We have not seen many old cleft grafts, and those we have seen were in very bad condition. Again we are waiting for the results of our colleagues in order to review our position on this.

Finally, as top grafting is the main activity of our company, we do have data now, from top grafted plots which we have worked on for 30 years.

3) Top grafting

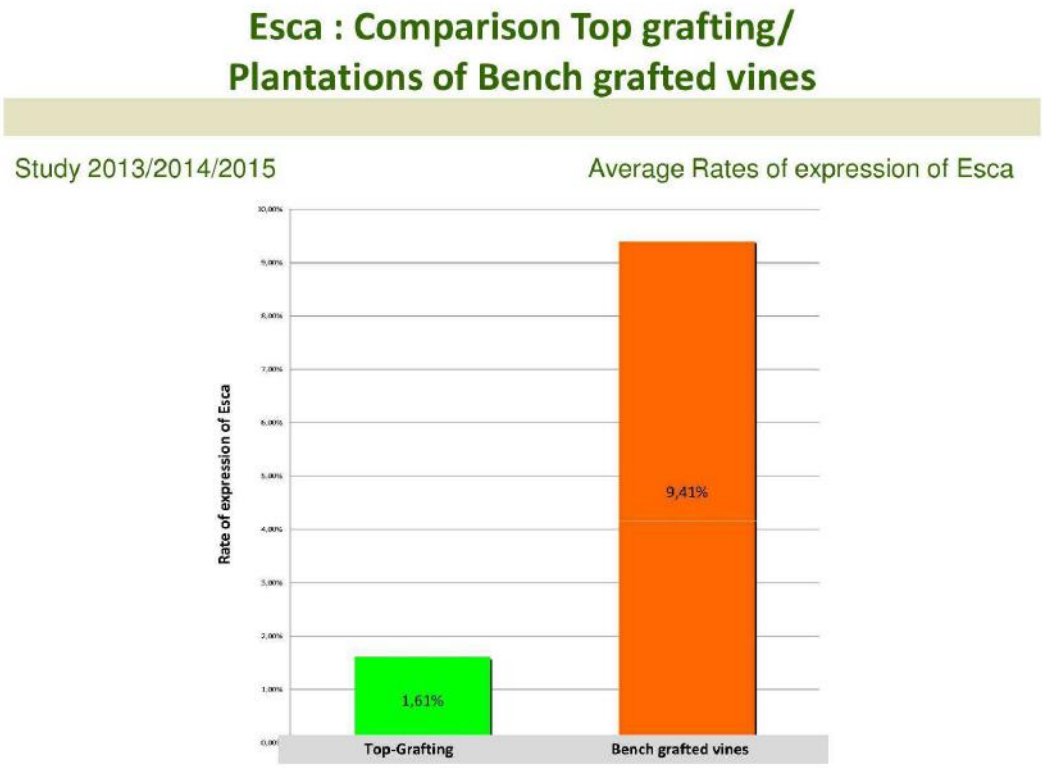


The term «Top grafting » usually refers to changing the aerial part of a vine, in order to change the variety, clone or to introduce a massal selection, while preserving the underground part and root of the vine.

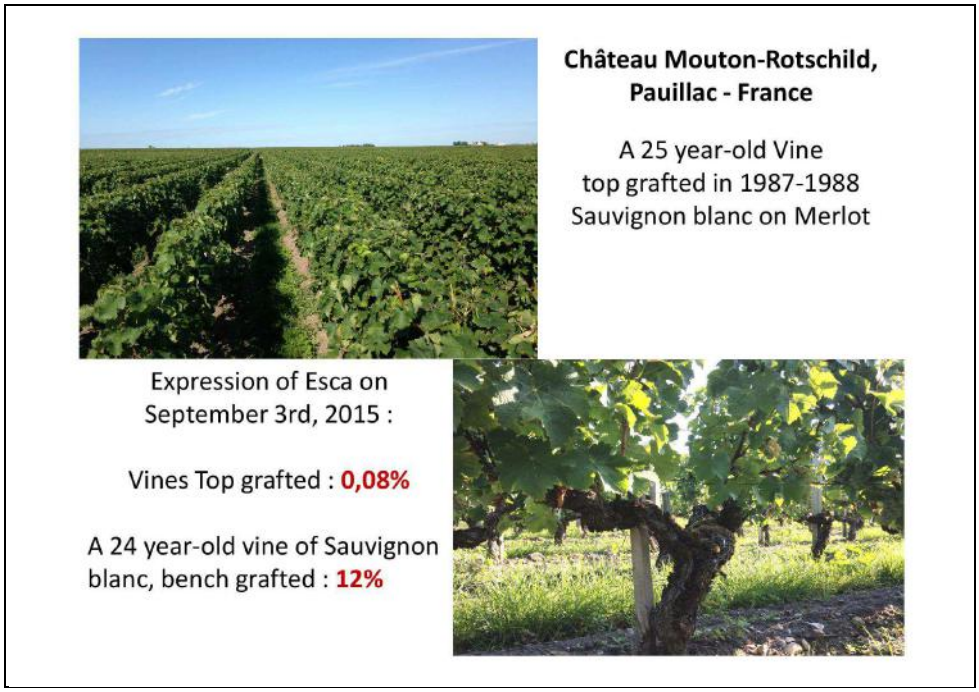
This exercise avoids having to uproot old and replant new vines, and changes the variety within one year, while keeping the benefit of well-established roots.

We have data, which is also available to researchers, on millions of top-grafted vines of many varieties. Special emphasis has been placed on the top grafts done in the last 15-30 years, with varieties which are very sensitive to Esca, including Sauvignon, Cabernet Sauvignon, Chenin.

These surveys are interesting because the comparisons are very explicit, even if top grafting will not completely rejuvenate the vines and the original nursery graft ‘rupture’ is still there.



We have seen an average level of Esca of 1,61% in top grafted vines, while conventional methods from omega bench grafts give a rate of 9 to 10%, which generally corresponds to a annual mortality greater than or equal to 2%.



We want now to review the most famous example. This is a 28 year old top graft of Sauvignon Blanc on Merlot. In our survey last month (September 2015) we found 0.08% Esca, while a neighboring 25 year old bench-grafted plot revealed 12%. To our knowledge

there are no mechanically-grafted Sauvignon blanc with such low rates of Esca, except those done with very old, pre-mechanical grafting methods.

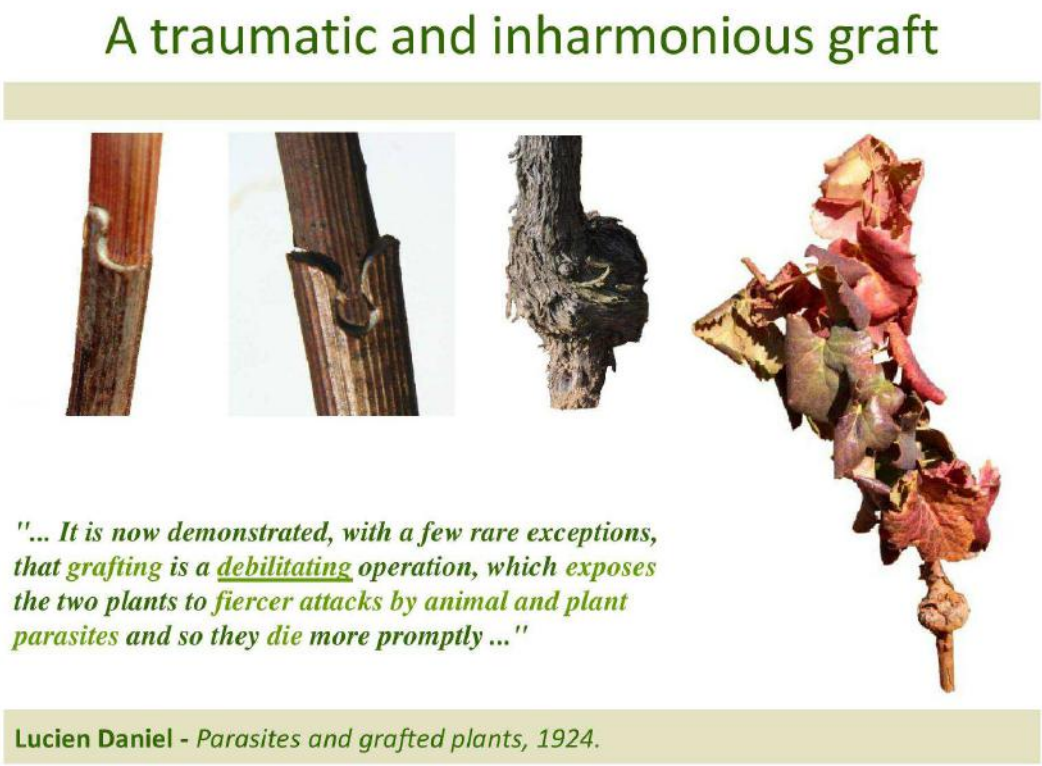
4) The quality of the graft

A major consequence of the phylloxera crisis of the late nineteenth century was a significant reduction in the life expectancy of vines. It was reduced by almost a third.

After that, manual or semi-manual grafting by nurserymen, or done by our grandparents in the field, gave the vines a life span of at least one hundred years.

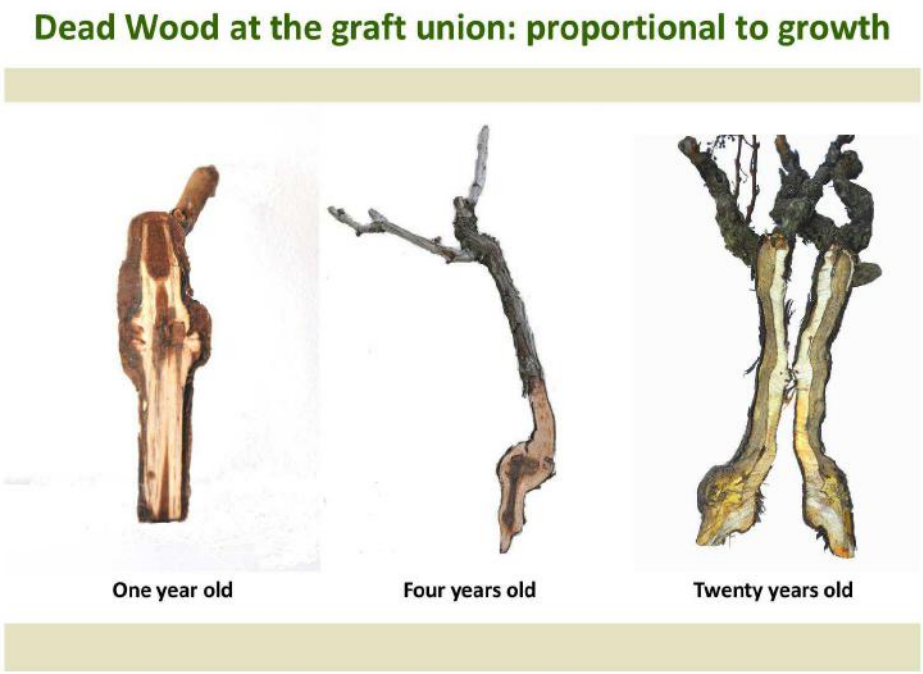
But by the mid-1970s, growers had abandoned the plant. They left the cloning and grafting to the general nurserymen. Since then, almost all vine plants are bench grafts assembled using the omega grafting technique.

This is concomitant with the unexplained increase of the expression of Esca. Unexplained, but not inexplicable.

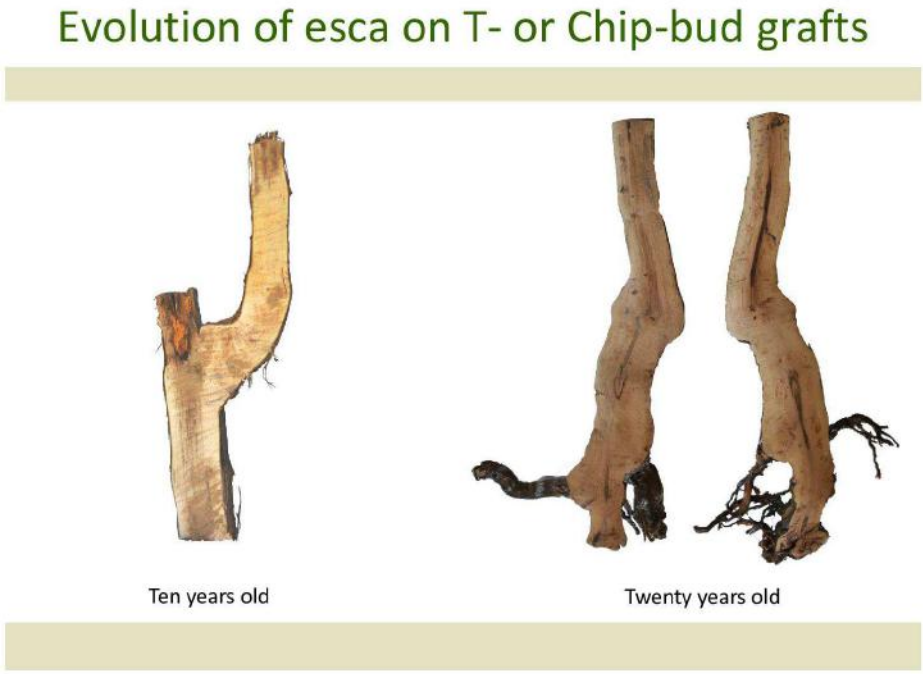


Mechanical grafts are performing in terms of productivity, but they have fatal flaws. They rarely allow alignment of the cambial tissue (a thin film underneath the bark) of the scion and subject.

We believe for a long time that all, or almost all, vine plants are carriers of saprophyte fungus. But they are only symbiotic hosts. The fungus only degrades dead tissues. However, a badly performed graft is an "original sin", creating a bottleneck which is the primary cause of the vascular accident, the stroke.

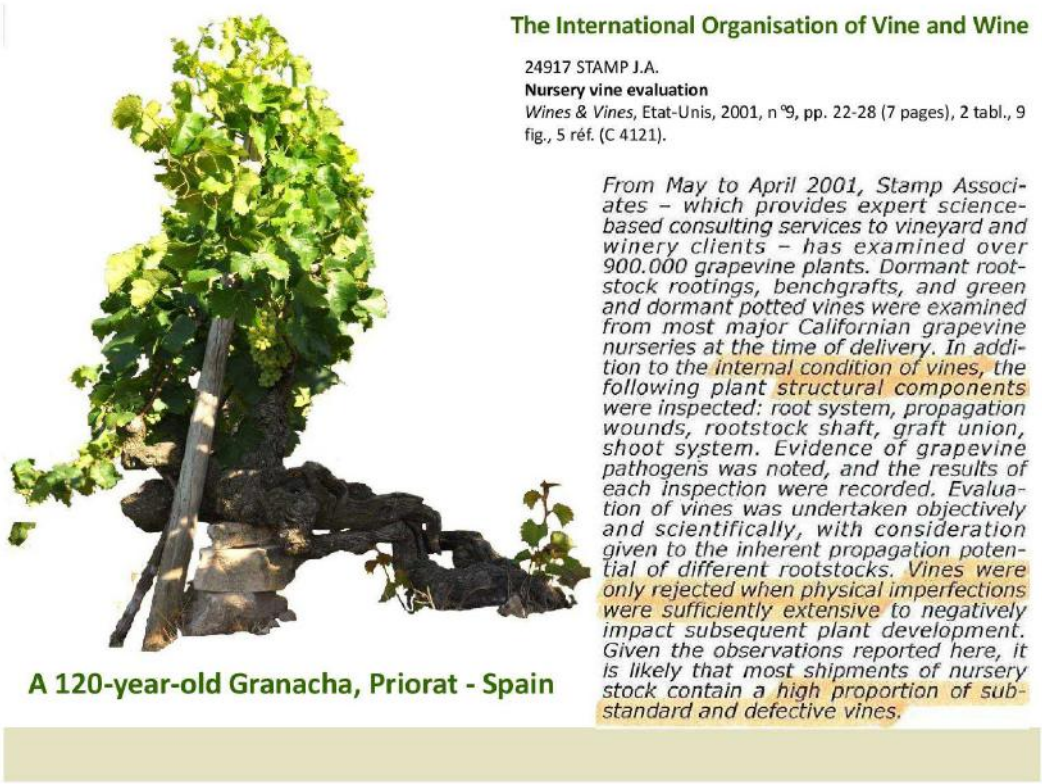


We can't tell you whether the microorganisms present in the wood monopolize the available water, causing interruption of sap flow, or if the toxins emitted by the fungi cause embolism, or whether other elements intervene to cause disruption of sap flow. However, the one certainty we do have is that strokes attributed to Esca are always accompanied by the presence of internal necrosis.



Yet a seamless graft, well vascularized and without necrotic tissue, such as those made with T-bud, Chip-bud or even well adjusted clef grafts, does not allow saprophytic fungi to grow.

And so we rejoin the other speakers. As in "Murder on the Orient Express" by Agatha Christie, there are several assassins, and each gives a stab. It may be the person who prunes the vines, the heat, the tractor driver, an uncontrolled weed, the labourer... But the most important among them, the one who deals the lethal blow of the dagger, is the machine.



In fact, the only point in common shared by the old vines without Esca, is the quality of the manual graft and not the quality of the pruning.

It is not enough to have a plant which appears strong, because the weld can be "forced" artificially, but one must have a plant free from dead wood. And to have this, the quality of the graft must be placed at the center of the debate.

Conclusion

Today we have to admit our incapacity in the face of a multimillennial disease, which is undergoing a very contemporary resurgence, and which is strangely concomitant with the mechanization of grafting.

We don’t have the time to go deeply into details and explanations. However, we wish to let all interested parties know that we remain entirely at their disposal with all our tests and surveys, because this matter merits further detailed investigation, conducted by genuine researchers, in order to find the true explanation.

We can’t be certain we can regenerate defective plants, but there is evidence that careful grafting preserves plantations. The evidence is there, in front of our eyes, in our vineyards.