

# Understanding Esca: watch out for the grafting type

Sourced from the research article "Impact of grafting type on Esca foliar symptoms"<sup>1</sup>

**>>> Black measles in English, Esca in French, Escha in Italian, Yesca in Spanish, Iska in Greek... This nightmare for winegrowers around the world creates confusion about its development and characteristics. Nevertheless, research progress has been made, and a recent scientific survey addressing the impact of grafting types on foliar symptoms added a new piece to the complex puzzle of understanding this disease. Full cleft grafts, directly made on the plot, have much better results. <<<**

Esca has been one of the most alarming threats in vineyards worldwide since the very beginning of winemaking. Although extensive research efforts worldwide have focused on the study of this complex syndrome, no satisfactory control measures have yet been found. Biotic and abiotic parameters that can favour or slow down its development are well known and multiple, i. e. rootstock and grape variety choice, training system, pruning type, age of the plot, water stress or soil type ; however, the difficulties in reproducing the symptoms under controlled conditions limit advances in understanding and controlling this syndrome.

The overall quality of plant material has frequently been questioned by winegrowers for its possible influence on Esca expression. Certain grafting types are particularly suspect. Even if researchers have shown over the years that grafting damages the vine and thus increases the opportunity for contamination by the local microbiome, no study has confirmed the suspicion on the techniques applied. This likely explains why a team of scientists<sup>1</sup> from the University of Bordeaux, the Institute of Vine and Wine Sciences (ISVV), Inra and Bordeaux Sciences Agro, supported by Worldwide Vineyards, decided to study the impact of grafting types on Esca foliar symptoms<sup>2</sup>.

Their observations were conducted over a two-year period on plots located in two French winegrowing regions (Bordeaux and Provence) and planted with Cabernet-Sauvignon and Mourvèdre, respectively. These two grape varieties were chosen because they are representative of their regions and sensitive to Esca. The researchers analysed *in situ* the expression of its symptoms on three grafting types: omega and whip-and-tongue (used in nurseries), and full cleft grafts (directly made on the plot). In order to obtain rapid results, they monitored a fifty-plot network, planted between 1950 and 2000. Hence, Esca, which takes several years to show up, was immediately noticeable.

## ■ Full cleft grafted vines are much more resistant

Over the two-year study period and in both grape varieties, full cleft grafted vines showed significantly lower percentages of Esca foliar symptoms than the omega and



## Apoplectic form VS foliar symptoms

The apoplectic form results in rapid dieback and death of the entire vine, especially in the summer.

Foliar symptoms of Esca – typical of its slow form – are interveinal yellow stripes in white cultivars and dark red ones in red cultivars. Symptomatic leaves can dry out and drop (necrosis).

On berries, dark spots may appear and in severe cases, berries crack and dry or are damaged (more common in northern America and not part of the survey).

whip-and-tongue grafted ones. In fact, during the first year of the study less than 1 % of full cleft grafted vines showed foliar symptoms while more than 6 % of the vines grafted using the other two methods were affected. In 2014, the phenomenon was even greater with still less than 1 % of affected full cleft grafted vines against more than 8 % for the whip-and-tongue and more than 10 % for the omega vine plants. The same significant effect of the grafting type has been observed by the researchers with regard to the apoplectic form of the disease, which impacted the omega and whip-and-tongue grafted plots more significantly than the full cleft ones.

## ■ Contamination occurs in the early years

Why such differences ? These results could be rooted in the first years of the grape vines' life. High rates of fungal



a. Full cleft graft b. Whip-and-tongue graft c. Omega graft

contamination have frequently been observed by researchers along the breeding process in nurseries (hydration, disbudding, callusing, rooting, etc.)<sup>3</sup>. As full cleft grafts are made directly on the rootstocks in the field, these vines are not subject to these “hostile environment” manipulations, giving them a better chance to remain healthy.

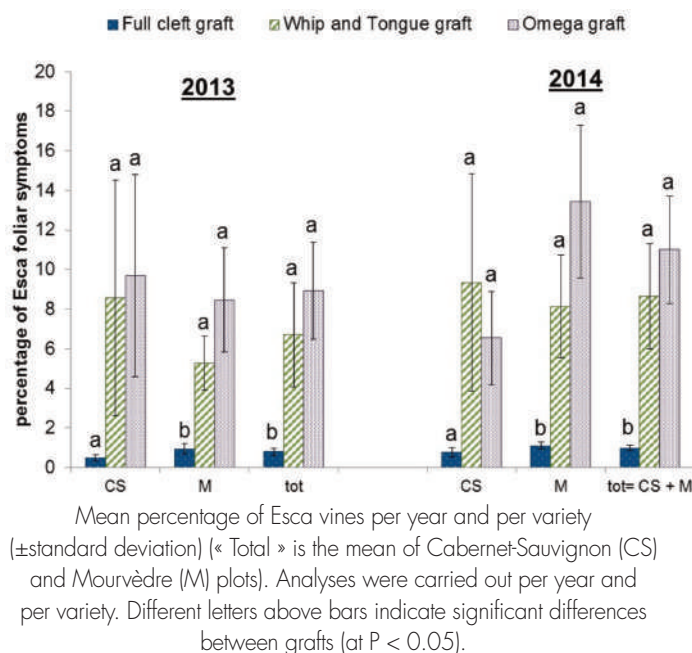
Other assumptions can explain this conclusion, such as the better quality of the full cleft graft method thanks to the larger contact surface between the rootstock and scion cambiums that minimises necrosis risk and enhances the future plant sap circulatory system set-up. Furthermore, this operation is performed on already well-rooted rootstocks, thus giving the vines the opportunity to allocate maximum resources to the development and robustness of their new vascular systems.

### ■ Whip-and-tongue is not a good alternative

Please note that the authors of the survey warn us about potential bias in their statistics, due to the age difference between the omega grafted plots (around 20 years old) and the other two grafted plots (more than 40 years old). Indeed, the greatest Esca expression is known to impact vineyards aged between 15 and 25 years<sup>5</sup>. Yet, in this study only the full cleft grafting plots and the whip-and-tongue ones were the same age, guarantying the validity of the comparison. The omega grafted ones were younger, as a result of the more recent development of this technic that replaced the others at the beginning of the 1980s because of its lower production cost. Therefore, only the comparison between the full cleft grafting plots and the whip-and-tongue ones is

### Huge differences between plots

The authors of the study have highlighted a strong local effect. Reported rates of vines infected by the slow form of Esca ranged from 0 % to more than 40 %, notably in the plots grafted with omega and whip-and-tongue methods. The literature suggests that this could be due to the planting of infected batches, produced intensively by nurseries in poor sanitary conditions<sup>4</sup>.



Mean percentage of Esca vines per year and per variety (±standard deviation) (« Total » is the mean of Cabernet-Sauvignon (CS) and Mourvèdre (M) plots). Analyses were carried out per year and per variety. Different letters above bars indicate significant differences between grafts (at  $P < 0.05$ ).

scientifically robust, and no definitive judgement can be made on the omega graft. However, these results indicate that the whip-and-tongue technic, mechanically performed in nurseries, would not be a good alternative to the omega technic.

The assumptions on the omega graft must be confirmed by new experiments implementing these three grafting types on the same plot. Surveys are underway but it will take time to observe the first Esca foliar symptoms and further unravel the factors involved in this syndrome. ■

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**4** National Grapevine Trunk Disease Survey conducted by the IFV (French Wine and Vine Institute) from 2003 to 2008