



Sugherificio Peppino Molinas & Figli S.p.A.

Headquarter: Località Ignazioni, Calangianus

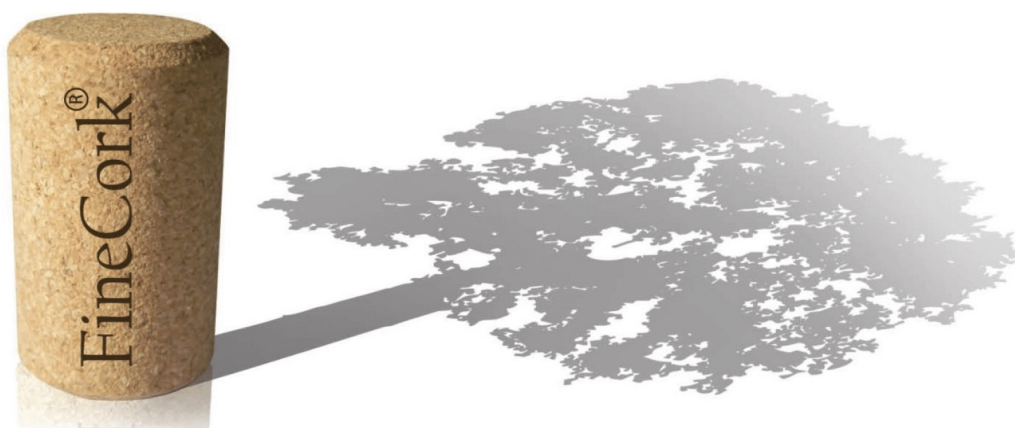
Branch: Via Belvedere 60, Arcole, Verona

www.molinas.it

Finecork® for Sparkling Wines



Technical report



When *nature* meets
tradition and technology

The Finecork® for still and sparkling wine is a cork stopper of new generation designed and manufactured by Molinas cork factory. The Finecork® for sparkling wine has been the object of a comparative study, autonomously and independently carried out by the “Comité Interprofessionnel Du Vin De Champagne” (from now on CIVC), a benchmark institute in the world of Champagne. The study has been published in the February 2016 issue of “Le Vigneron Champenois”, the official magazine of the “Comité”, by the CIVC technical Department. For more information, please directly check their article. **From now on, the quotations extracted from this report, will be put between quotation marks and in italics.**

The research

The comparative study, began in the first weeks of the year 2012, has been coordinated by the “CdC” technological and environmental pole comparing 12 types of micro-granulated cork stoppers without cork discs manufactured by the main European cork stoppers manufacturer (altogether 8 companies). Molinas cork factory took part with the Finecork® cork stopper. In this plan, four of the most important and reliable laboratories of European renown, that is “*Exact*” in Macon, “*Excell*” in Merignac, “*Pure Environment*” in Perpignan and “*Vect'Oeur*” in Beaune. The analyzed cork stoppers were unbranded, consequently completely anonymous in order to guarantee the maximum impartiality of the research. The aim was the one to measure its performances from a physical-mechanical point of view, the sensory anomalies and the suitability to food contact. More precisely, as regarding the physical-mechanical aspect: the cork stopper suitability to corking and uncorking, and the gaseous interchanges in the time. From the sensory point of view, it has been assessed the transfers of tainting substances coming from the cork and that can alter the wine profile. With regard to food contact, the attention has been focused on the cork stopper sanitary safety (specific migrations of the different chemical compounds used during the cork stoppers manufacturing). The samples have been bottled in three wineries of the Champagne area (Mumm, Union-Champagne and Comité Champagne). Consecutively the complete list of the assays carried out during this study:

- **Cork depth**
- **Extraction force (uncorking)**
- **Pressure drop (CO₂)**
- **Oxygen entrance and consumption**
- **Suitability to food contact**
- **Sensory analysis**
- **Instrumental analysis with the gas-chromatography techniques**

Cork depth

“The depth of the nominal insertion taken in consideration in our experimentation was of 24 mm of cork depth with regard to mouth finish. The figure 1 shows that this parameter is respected. With a similar adjustment, it can be obtained values fluctuating within the tolerance (+ / - 2 mm) underlined with the brown lines. The results are stable in the time, at least up to the end of the study (that is after 26 months).”

As we can see in the following graph, there are no particular differences among the analysed samples: pointed out in red colour, the performance of the Finecork® cork stopper that is within the average.

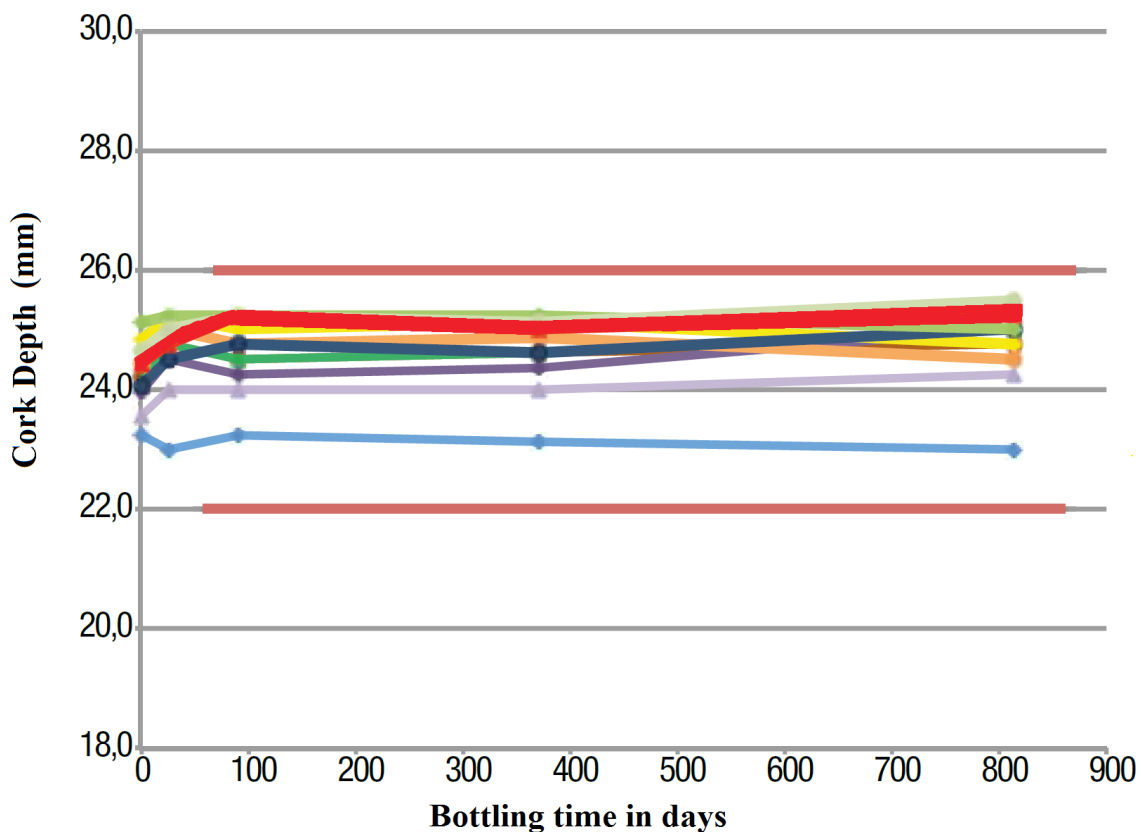


Figure 1: measurements of the cork depth, Le Vigneron Champenois, page 73, February 2016

Extraction force (uncorking)

Similarly to the first assay, also in this case the analysed products are more or less all at the same level. The assay has been carried out during a period of 26 months, analysing the values evolution of the extraction force following the variation of the corking time. Obviously, the extraction force changes from person to person and it is subjective, nevertheless for this test it has been used a special instrument, the so called “torque meter”, for an objective assessment.

The limit values oscillate from 1,2 Newton per meter (the so called dangerous or fast uncorking) to a maximum of 3 Newton per meter (too difficult or impossible uncorking). The values of

FineCork® cork stoppers are underlined with the red colour.

“This extraction force evolves in a similar way for all the cork stoppers (figure 2), remaining within values corresponding to some extractions that are between “firm” and “easy”.

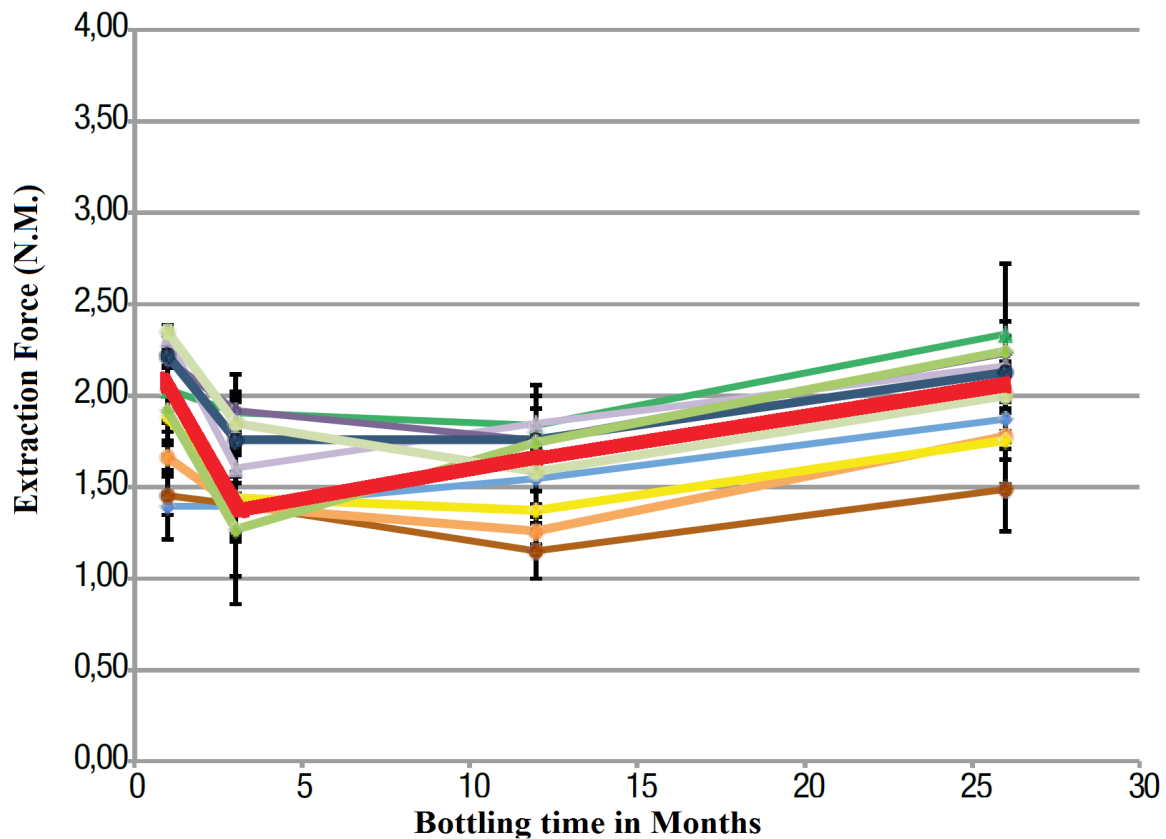


Figure 2: values of the extraction force measured with the torque meter, Le Vigneron Champenois, page 76, February 2016

Pressure drop (CO2)

“Some pressure drops, variable according to the batches (figure 3), can be observed, sometimes near zero, but that can reach up to 0,5 bar after 26 months. At this stage, these pressure drops are difficulty interpretable, they have to be put under control in case of longer corking.”

This kind of test, carried out with a high precision laser aphrometer, points out more marked differences according to the cork stopper.

The values of the FineCork® are among the most satisfactory, highlighting a pressure drop practically equal to zero during all the 26 months of the assay. The performance of our product can be examined in the following graph, as usually the values of FineCork® are underlined with the red colour.

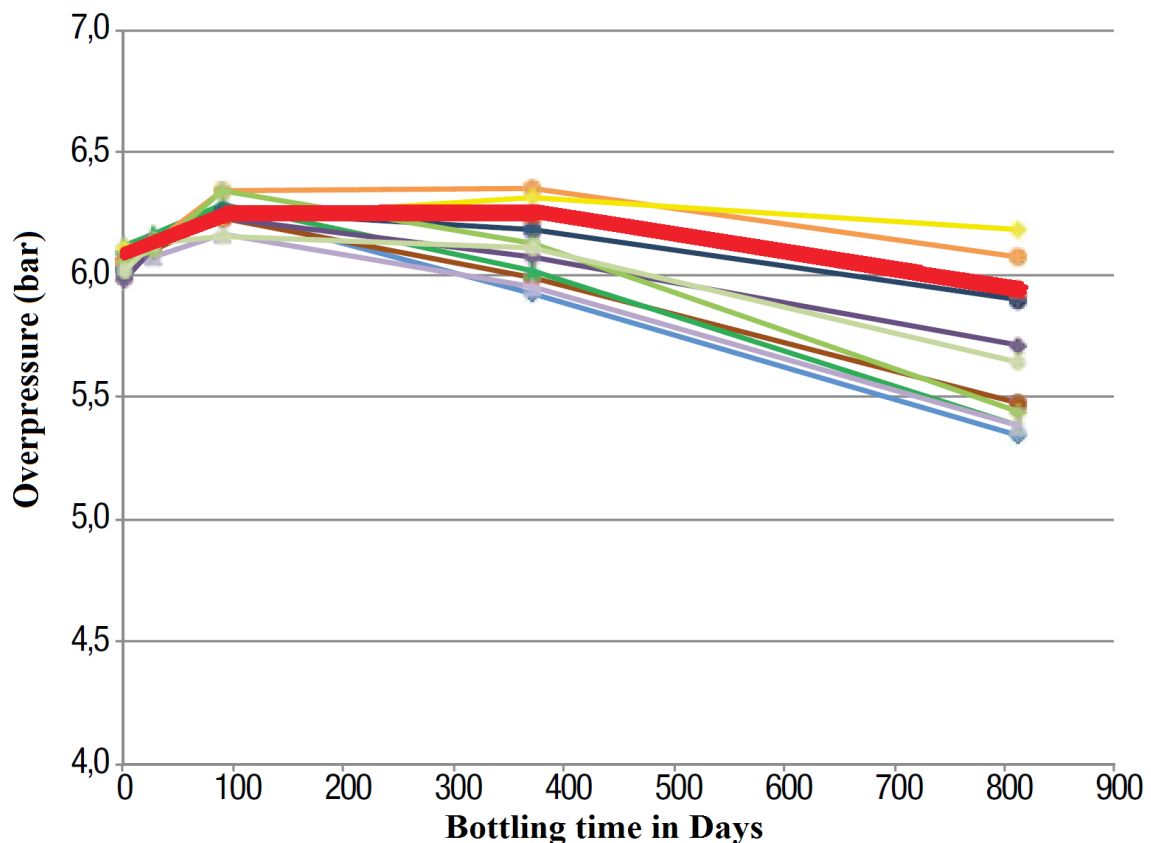


Figure 3: drops of CO2 in the different samples, Le Vigneron Champenois, page 77, February 2016

Oxygen entrance and consumption

For this kind of assay, it has been tested also a sample of two traditional cork stoppers with two cork discs. Also in this assay, the FineCork® has been one of the most performing products, with values among the lowest detected on the analysed samples with regard the oxygen entrance, also better than one of the two cork stoppers samples with two traditional discs.

“The measurements carried out thanks to the fluorescence method, show that the phenomena described by the cork stoppers with two discs are similar to those obtained with some micro-granulated cork stoppers. As comparison, on the figure 4 are reported the measurements carried out on all the micro-granulated cork stoppers and on two traditional cork stoppers with two discs. Some micro-granulated cork stoppers, or at least the tested batches, release, in the 50 days after the corking, quantities of oxygen that can vary from a quantity to its double”

At this stage of the assay, it has been also assessed (through the indirect method of the oxygen consumption in water with CO2) the transfer of the phenolic compounds, by instance the tannins, of the micro-granulated samples compared with the cork stoppers with two traditional cork discs: the micro-granulated cork stoppers have a lower transfer of tannins. As usual, the red line points out the performance of FineCork® in the assays concerning the oxygen entrance.

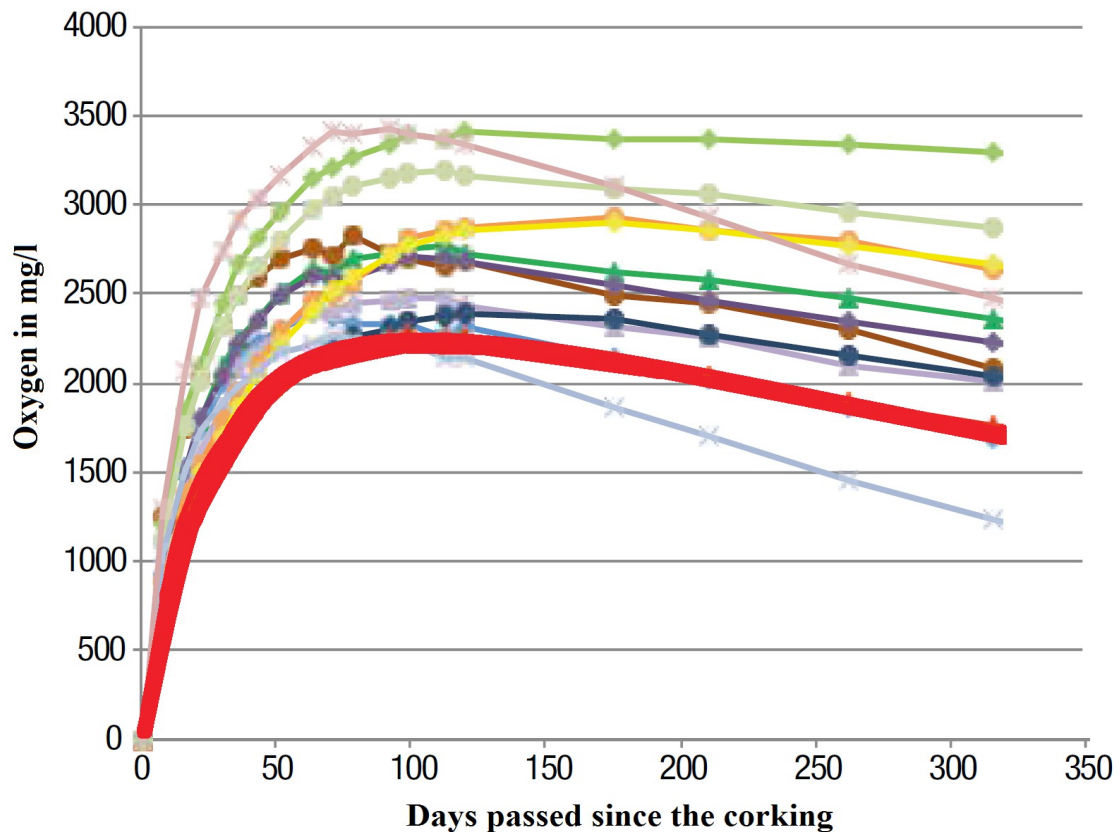


Figure 4: oxygen entrance during the corking days, Le Vigneron Champenois, page 75, February 2016

Suitability to food contact

“The suitability to food contact of all the supplied and tested closures has been assessed by the cells CECA and CESPROP, established for this purpose. They refer to two independent experts that drawn up the report, after the analyses carried out by specialized laboratories that the cork stoppers put in contact with wine don’t release any substances that could represent a danger for the consumers health. The aim of the analysis has been the one to show the absence of migration or, at least that the hidden traces are lower than the limits of the specific migrations imposed by the law for some molecules, in the standard conditions of contact. The conclusion of the experts has been formulated on the basis of the knowledges and of the normative texts in force at the moment of the survey. The products used for the production of the traditional cork stoppers with 2 discs and for the micro-granulated cork stoppers, positively valued respectively by the cells CESPROP and CECA, are added on some lists published in the Vigneron Champenois and updated on the extranet site of the Comité Champagne.”

FineCork® got the certification, unlike 5 of the 12 samples included in the test.

Sensory analysis

As already told in advance, in the introduction of this report, the cork stoppers have been corked in three different wineries and the wines have been tasted after 1,5 and 24 months from their bottling. The most definite differences have been observed between 5 and 24 months. In every analysed period, the champagne sealed with FineCork® is free from every sensory anomaly, confirming it as the best cork stopper, together with other four cork stoppers.

“During the tasting, the anonymous bottles have been divided in the tasting room, in ten bottles for every batch. Every member of the jury (seven persons), had to point out, for every tasted wine, the presence or not of a sensory anomaly and its intensity, on a scale from 1 to 5, quoting the detected defect”.

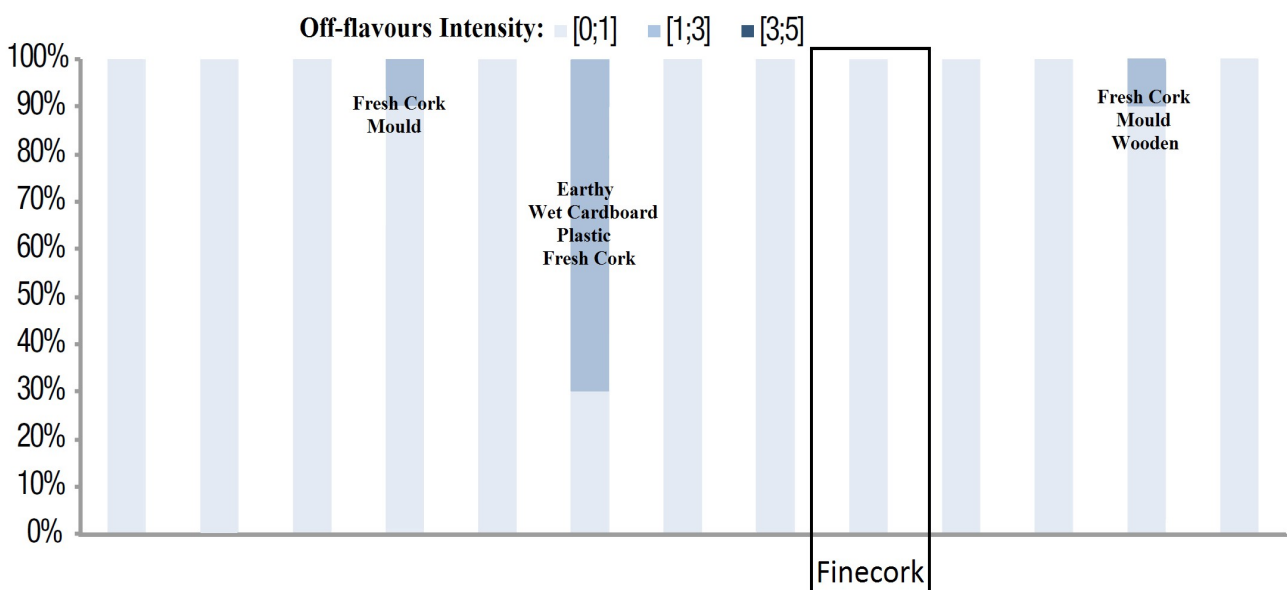


Figure 5: Deviations detected 1 month after the bottling, Le Vigneron Champenois, page 77, February 2016

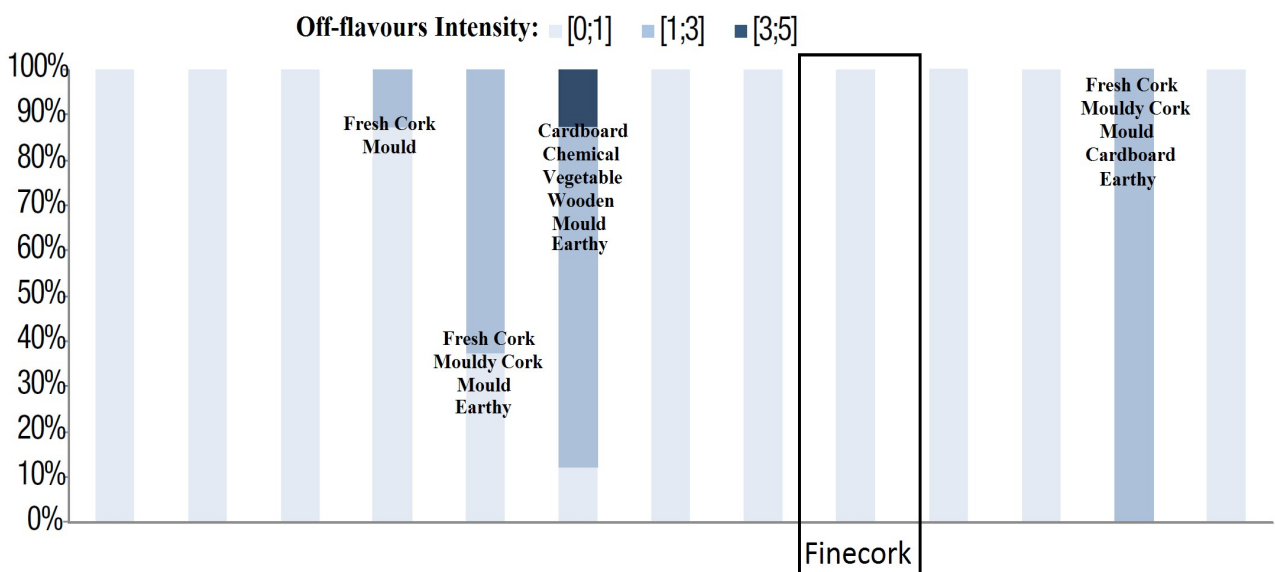


Figure 5a: Deviations detected after 5 months of bottling, Le Vigneron Champenois, page 78, February 2016

Observing the second and the third graph, we can notice how contaminations, as time goes by, above all in the samples already tainted during the first month of bottling, become more marked. The deviations often detected are those of “cardboard”, “wet cloth” and “mouldy cork”.

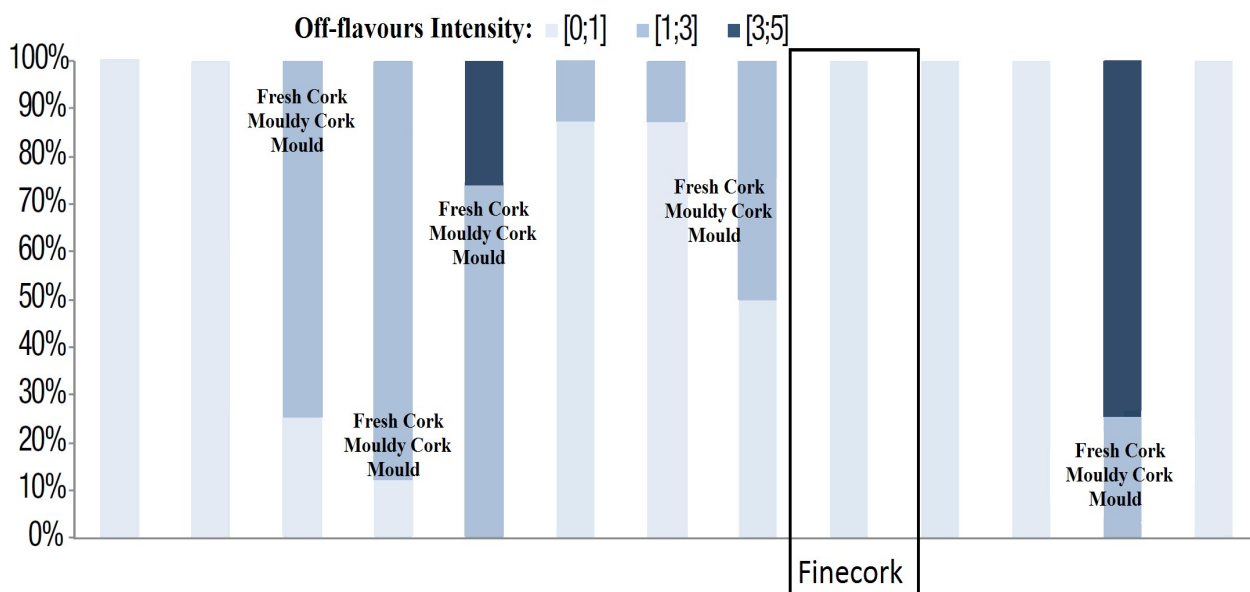


Figure 5b: Deviations detected 24 months after the bottling Le Vigneron Champenois, page 78, February 2016

“The figures 5, 5a and 5b re-present the results compilation of the tasting obtained by one of the institutes respectively 1,5 and 24 months after the bottling, underlining with light blue the absence of defect (average of the notes between 0 and 1), in darker blue an average defect (average between 1 and 3) and in ultramarine a strong defect (average between 3 and 5). The results are extremely net, particularly after 5 and, above all, after 24 months. When a defect is detected on a batch, it affects all the bottles without exception. Besides this, the intensity of this defect increases as time goes by”.

Instrumental analysis

The uncorked cork stoppers of the previous test, have been sent to four independent laboratories (quoted at the beginning of this report) to assess the transfers of the cork tainting substances.

The FineCork® confirms the assessments emerged by the sensory test remaining under the limit of 0,5 ng/L.

“For the dosage of these compounds, the four laboratories made an individual soaking for every cork stopper, to extract the releasable compounds. The soaking liquid is a hydro-alcoholic solution in which the alcohol content and the pH are similar to those of wines. A quantification of the anisoles and halophenols releasable in the soaking solution has been carried out with a gas-chromatographic technique combined with mass spectrometry. The results of the sensory analysis

are perfectly corroborated by the results of the chemical analysis.”

Further and exhaustive studies confirmed FineCork® perfect suitability not only concerning TCA transfers, but also for many other substances coming from the cork stopper, responsible for off-flavours in the wine, as listed in the following table:

<i>Substances</i>	TCA	TeCA	PCA	TBA	TCP	TeCP	PCP*	TBP
<i>FineCork®</i>	0,35	0	0	0	0,25	0	1,25	0

Table 1: substances released by the FineCork® cork stopper . * PCP detection threshold: 30000 ng/L

This data collection points out that FineCork® is the ideal seal, both from a sensory and physical-mechanical point of view, for sparkling and semi-sparkling wines.