Temperature and Temperament in Champagne

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HIGH TEMPERATURES ARE BAD for wine, bubblies included. **eProvenance**, a Franco-American company that provides fine wine transport and storage monitoring through high-tech sensors, recently released a study conducted with the **CIVC** (Comité Interprofessionnel du Vin de Champagne) on temperature and temperament in Champagne, which confirmed that long exposure to high temperatures, particularly above 30° C/86° F, changes aromas, taste and color. It also changes the mousse of the wine and the performance of the cork. eProvenance has also worked with **Champagne Mumm** directly on similar studies.

eProvenance worked with **Michel Valade**, head of the CIVC's technical and environmental division, the **Lycée Viticole d'Avize** and **SOFRALAB**, a provider of oenological products and services, to study the Champagne distribution system and to simulate typical temperature conditions during transport and storage based on eProvenance's database of Champagne shipments subjected to unsuitable conditions. eProvenance's sensor technology monitors temperature and humidity coupled with geolocation to pinpoint where adverse conditions affect wines. Based on thousands of data points collected between 2010 and 2016, eProvenance showed that of their monitored shipments, 15 percent to the USA, 30 percent to Japan and a whopping 90 percent to China, are subjected to temperatures above 25° C (77° F).

What happens when wines are subjected to temperatures above 25° C? There are five critical results:

1. Oxygen ingress causes aroma oxidation
2. Loss of protective SO_2
3. Decrease in anthocyanins and purple, blue, mauve, red and pink colors, leading to the onset of browning
4. Ethyl carbamate forms
5. Corks begin to push

Wines from 17 Champagne houses, including **Cattier**, **Drappier**, **Lanson** and **Nicolas Feuillatte**, were subjected to a series of tests in isothermal ovens then compared to the control wines cellared at 15° C/59° F. The tests were based on protocols from historical eProvenance data. Wines were subjected to temperatures of -4° C, 30° C and 45° C. In order to reduce potential heterogeneity in the wines, all wines submitted for testing were sur lattes samples disgorged at the CIVC and given a dosage of 8 milligrams per liter of MCR (moût concentré rectifié, or concentrated and rectified grape must, which is more neutral in flavor and oxidizes less quickly than traditional liqueur) and a sulfur addition of 15 milligrams per liter, then closed with a technical cork. All wines were non-vintage blends of Pinot Noir, Pinot Meunier and Chardonnay. As such, the vintages in the blends were unknown. In this regard, the differences in the wines were specific to each house's style.

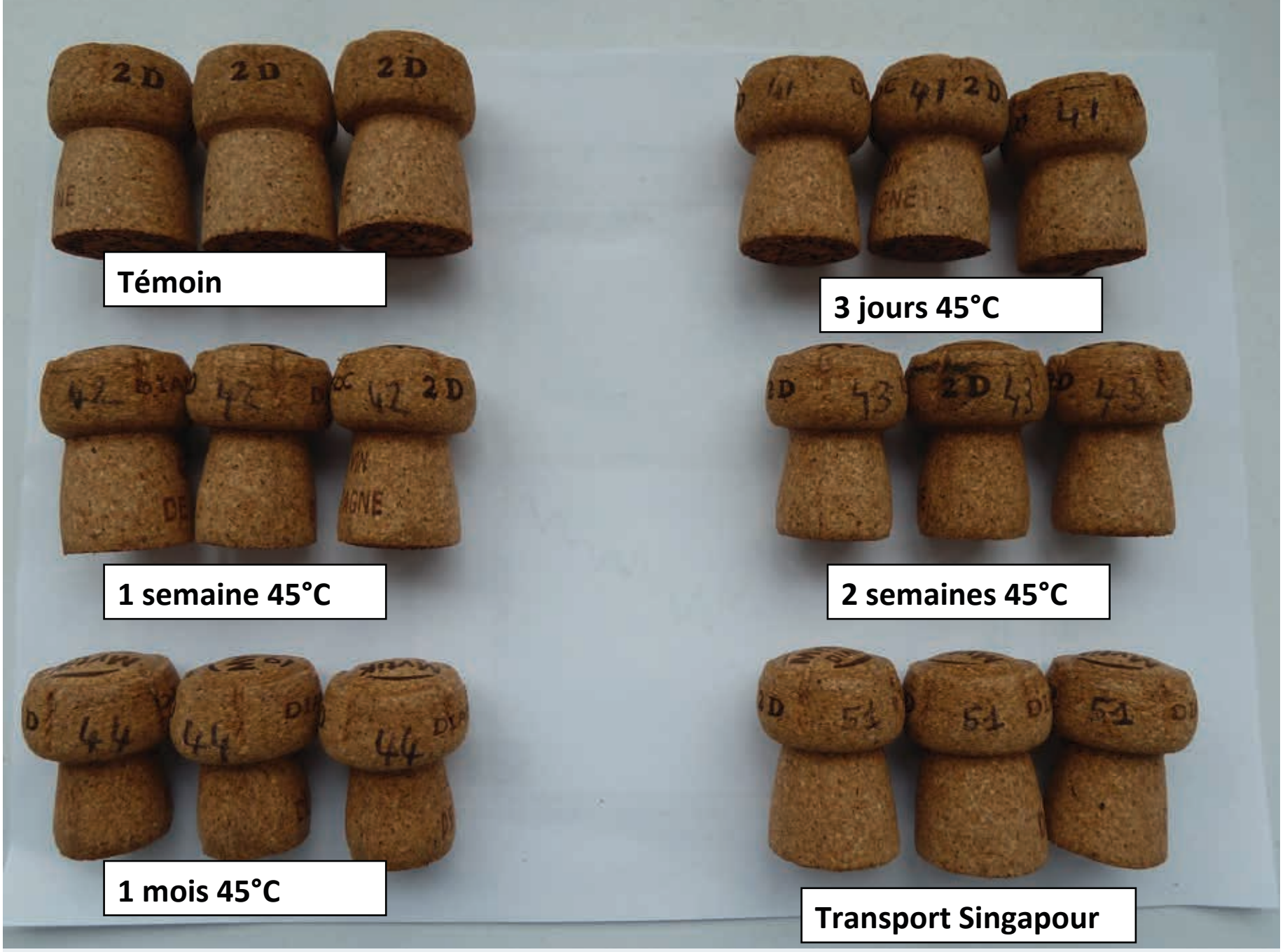
Various sets of analyses were taken. Three-way tastings were conducted immediately after the temperature tests then again two months after the tests. Color change was observed both by the eye as well as with a machine that measures CIE L*a*b*, a mathematical description of all perceivable colors in the three dimensions: L for lightness and a and b for the color opponents green–red and blue–yellow. In the 2014 study with Champagne Mumm, the wines' moussability, after opening, was also measured by a machine called **Mosalux**.

The tasting panel results are, of course, subject to human error. However, it is interesting that the CIVC commented that the wines seemed to be most affected immediately after exposure and that the longer the period after the exposure (up to eight months post-exposure), the effects seemed to show less severely, even in wines subjected to 45° C.

The panel concluded that the -4° C had little negative effect, however, damage could be detected when wines were subjected to temperatures of 30° C for a period of seven to 14 days, as well as in wines subjected to 45° C for as little as three days. Effects included frothability increases, difficulty in opening the bottles, cork shrinkage, browning, an increase in bitter aromas and an accentuation of reduction aromas (sulfur, rubber and cooked vegetables). Interestingly, however, there was no change in the overall pressure of the bubbles or the free and total SO_2.

These experiments could be the beginning of many more studies to test other variables to understand the effects of temperature on Champagne temperament. However, if producers, transporters and storage facilities improve the conditions for Champagne, there could be no need. Here are eProvenance's suggestions, not only to Champagne houses but for all wine producers:

1. Even for short-duration truck shipments to nearby locations within Europe, importers should use reefer trucks or at least an insulating cover to smooth out temperature variations. (If using an insulating cover, it is worthwhile to assure the wines start out at an appropriate temperature before loading.)
2. For international shipping, the use of reefer containers is recommended because the temperatures in dry containers are often too high for Champagne.



Corks post-opening after being subjected to different temperature conditions: *Temoin* is the control cork. Other photos show changes in days (*jours*), weeks (*semaines*) and months (*mois*) at 45°C. *Transport Singapour* exhibits the effects of a shipment exposed to 30°C heat for two weeks.

3. For temperature-controlled transport, ensure that the reefer is kept at a consistent, appropriate temperature from start to finish. (eProvenance has recorded instances of the reefer being turned off/on during a journey.) This will prevent day/night fluctuations before and after the ocean voyage.

• The best position for a container is always below deck where the sun is not much of a factor. Ironically, these positions are often reserved for reefer containers.

• The risks vary, but eProvenance often sees the most dramatic fluctuations on the "shoulders" of intercontinental/ocean-crossing journeys. The temperatures during ocean voyages tend to be more stable although often too high. Strategic placement of the container centrally within the ship (away from external walls) can help.

4. Producers should monitor their shipping partners. Even those with the correct systems in place may end up with wines subject to adversely high temperatures. Additionally, consider that when importers and distributors are more concerned about economics (opting for dry vs. reefer because it's less expensive) than quality, problems arise.

• Moreover, eProvenance has found that the freight forwarder's facility (warehouse or the trans-shipment point) is a significant point of high-temperature exposure.

5. Pay attention to the storage conditions after the shipment is received. Proper storage conditions need to be maintained to protect the wine.

6. It is valuable to capture details on all stages of the shipment, such as departure and arrival dates of vessels, customs clearance, time in storage facilities, etc. This information helps identify where the shipment was properly cared for (thus desirable to repeat) and where problems arose that should be corrected and avoided going forward.

While the wine business has made great strides in progressive and proactive shipping standards, the reality is that even the best intentions and most herculean efforts can be squelched by inadvertent mishaps along the chain. Attention to detail on both sides of the equation is critical. Producers, agents and importers cannot take for granted that all will go according to their instructions, even on short voyages. Caveat emptor. **WBM**