

TECH POINT

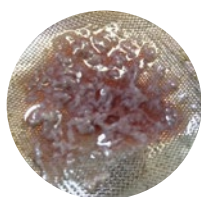
QUERCETIN

WHAT SOLUTIONS ARE AVAILABLE TO TAKE ACTION AGAINST THIS POLYPHENOL RESPONSIBLE FOR A GROWING PROBLEM?

WHAT IS QUERCETIN AND WHY IS IT A PROBLEM?

Quercetin is a **polyphenolic compound of the flavonoid class**. More precisely, it is a flavonol whose main function is to protect plants against the risk of oxidation due to sunlight (UV) or other stress-inducing environmental factors.

Essentially it is found in grape skin and is linked to sugars (**quercetin glycosides**). The slow hydrolysis of this glycosylated form during fermentation and all through the aging process leads to **the release of its aglycone form, whose precipitation causes the formation of an undesirable solid deposit in the bottle**.



Quercetin deposit in the bottle.

Quercetin content depends mostly on the genetics of the grape variety. It was scientifically documented that **Sangiovese naturally contains higher than average amounts**.

Due to climate change and the evolution of viticultural practices, a **substantial number of varieties could be affected by this issue in the future**. In fact, some cases were detected in Pinot Noir (NZ and Oregon), Primitivo/Zinfandel (California and Puglia), Nebbiolo (Piedmont and Corsica), Merlot (Tuscany), Gaglioppo and Magliocco (Calabria), and more recently in Aglianico (Campania).

WHAT MEANS ARE CURRENTLY AVAILABLE TO TAKE ACTION AGAINST QUERCETIN?

At this time there are **no fining products** able to remove significant amounts of quercetin glycoside (Figure 1 - in blue). The only known treatment against quercetin aglycone **that works is PVPP** (Figure 1- in grey). However, treatment with high doses of this molecule can negatively impact organoleptic properties. Also, it cannot be used in the production of organic wines.

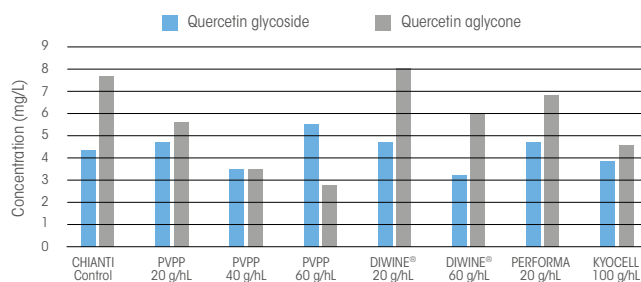


Figure 1. Effects of different fining products at different concentrations (PVPP, PVP/PVI, Bentonite and CMC) on concentrations of quercetin glycoside (blue) and aglycone (grey).

PVPP is effective to temporarily solve the issue. But if an excessive amount of quercetin aglycone is added, release can be ongoing over time and may result in new precipitation. So **clarification is a stopgap measure that does not consider the wine's lifespan**.

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TWO KEY STAGES OF THE PROCESS IDENTIFIED BY OENOFRANCE®



1

Enzyming

SPECTRA
QUERCETIN FREE

Preventive action right from the start of the aging process.

2

Fining

Phylia® Epl

Enzyme preparation specifically studied for its pectolytic activities.

- Releases quercetin aglycone in a targeted manner.
- Facilitates the clarification and natural sedimentation of quercetin aglycone with no major impact on other polyphenols.
- Enables the issues of residual free quercetin to be managed over time.

Fining product **exclusively formulated from yeast protein extracts** for fining that respects the organoleptic characteristics of the wine.

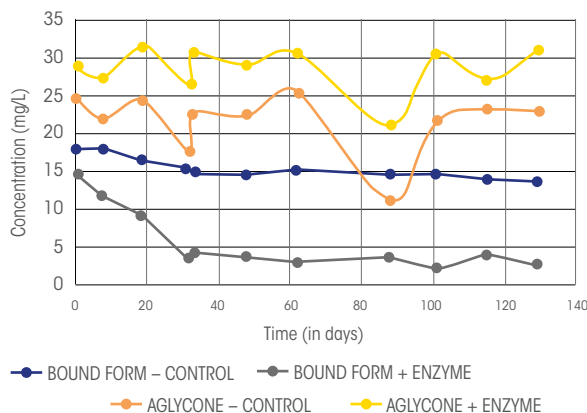
- Eliminates quercetin aglycones.
- Lowers the concentration of quercetin likely to precipitate.

RESEARCH RESULTS

SPECTRA® QUERCETIN FREE resulted from a **4-year** research program in collaboration with the **University of Padua, Italy**. It enabled Oenofrance® to demonstrate that the most effective way to eliminate quercetin from wine is to take action against both forms of the molecule.

- The **first stage is preventive**, selectively taking action against the **bound form**.
- Fining with an **effective fining agent** to **eliminate its aglycone**.

Figure 2 below shows that degradation of the bound forms of quercetin occurs very slowly (control – blue line). In contrast, **fast degradation of this form** can be seen in the sample treated with the enzyme (trial – grey line). Released aglycone tends to **precipitate over time** (trial – yellow line).



Fining with **PHYLIA® EPL** enables **fast elimination of quercetin aglycone** (Figure 3).

According to trials performed under cellar conditions, **treatment with PHYLIA® EPL enables quercetin aglycone content to be significantly reduced (up to 50%)**.

PHYLIA® EPL respects wines and can be used in the production of organic wines.

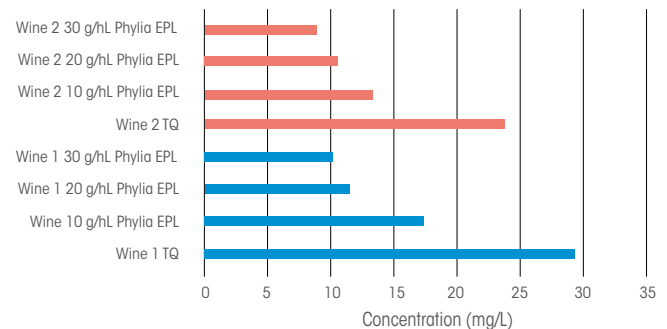


Figure 3. The impact on quercetin aglycone concentration of adding PHYLIA® EPL to red wine (Sangiovese, Chianti).

Figure 2. Quercetin glycoside and aglycone concentration over time after being treated, or not, with SPECTRA® QUERCETIN FREE

Read the scientific article to learn more about this topic