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Brown Marmorated Stink Bug taint in grape must and wine: time evolution of trans-2-decenal

The brown marmorated stink bug (BMSB, *Halyomorpha halys* Stal) is an invasive pentatomid native to eastern Asia that is spreading rapidly worldwide, notably through human-mediated activities. Globally, it was reported in the USA, Canada, Italy, Hungary, and other European countries. BMSB has a broad host range that includes over 170 plants, many of agricultural importance, including various fruit, vegetables, row crops, and ornamentals. When present in the vineyard, the pest can affect yield and quality by directly feeding on berries resulting in fruit collapse and necrosis. Additional damage occurs when BMSB are carried into the winery within the grape clusters. The presence of BMSB during wine processing can affect juice and wine quality through the release of volatile compounds produced as a stress response. The major secreted compounds are tridecane and trans-2-decenal. Tridecane is an odorless compound and its effect on wine quality is currently unknown. Trans-2-decenal is an unsaturated aldehyde considered to be the main component of BMSB taint with strong green, coriander, and musty-like aromas. Its threshold value in wine was estimated at about 5 µg/L.

The present study aims to evaluate the chemical/biochemical stability of trans-2-decenal and its longevity in grape juice and wine. The target compound was added at 200 µg/L in grape juice and the sample was split in two subsamples. One subsample was microbiologically stabilized using sodium azide, and the other one was subjected to a normal fermentation process. The concentration was monitored over the time by GC-MS technique highlighting a decrease of trans-2-decenal in both experimental conditions. The degradation occurs faster in fermented samples, probably due to the biochemical activity of the yeast and, just after 15 hours from the beginning of fermentation, the compound was no longer detected (<0.1 µg/L). Moreover, the stability of *trans*-2-decenal was also monitored in wine (200 µg/L) at two different temperatures: 4 and 30 °C. The degradation was also observed in the fermented media, with a strong dependence on temperature. The half-life period was estimated to be 10 days and 1 day at 4 and 30 °C, respectively. The results obtained in this study show that the molecule responsible for the unpleasant odour characteristic of BMSB degrades during the first stages of the fermentation. In the case of a further contamination or residue of the molecule at the end of the alcoholic fermentation, *trans*-2-decenal continues its disappearance with a slower kinetic rate, depending on the temperature.

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