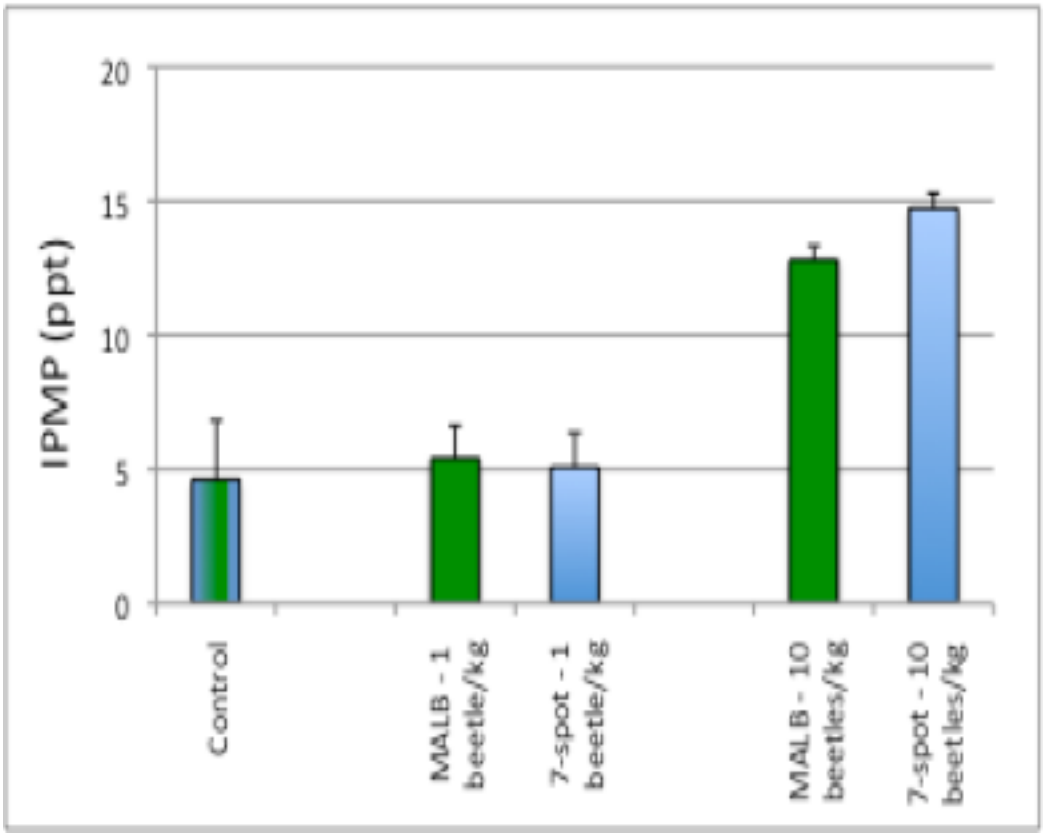
Cool Climate Oenology & Viticulture Institute
Brock University

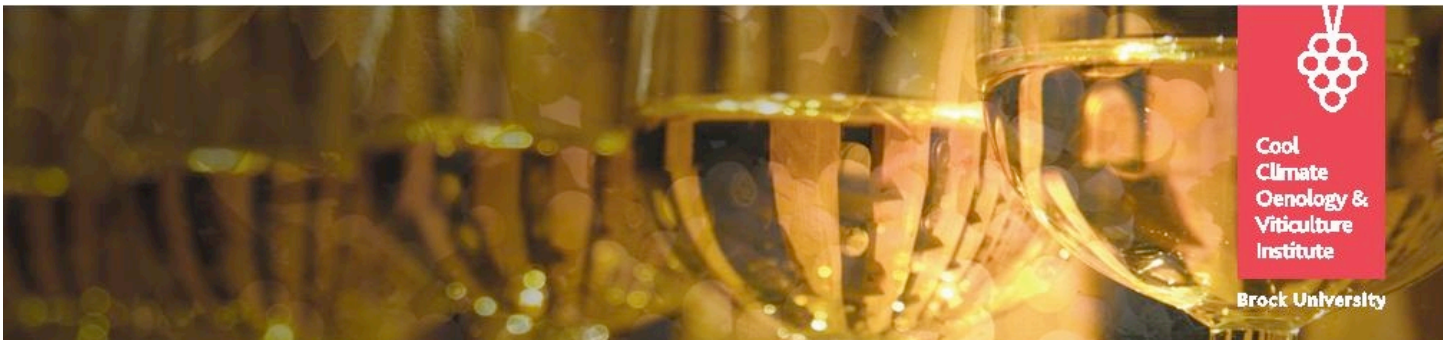
Post-harvest prevention and remediation of ladybug taint

Given the significant impact ladybug taint (LBT) can have on wine quality, below is a list of options to consider to assist in reducing LBT if you find yourself processing grapes with ladybugs present.

1. **Both the Multi-coloured Asian Ladybeetle and the 7-Spot Ladybeetle are almost equally damaging to wine quality.** There is no need to differentiate between the two species when handling fruit, both species need to be removed (Botezatu, A. and Pickering, G.J. 2010. Ladybug (Coccinellidae) taint in wine. IN Reynolds, A. G. Understanding and Managing Wine Quality and Safety. Woodhead Publishing Limited, Cambridge, U.K., 418-429.).

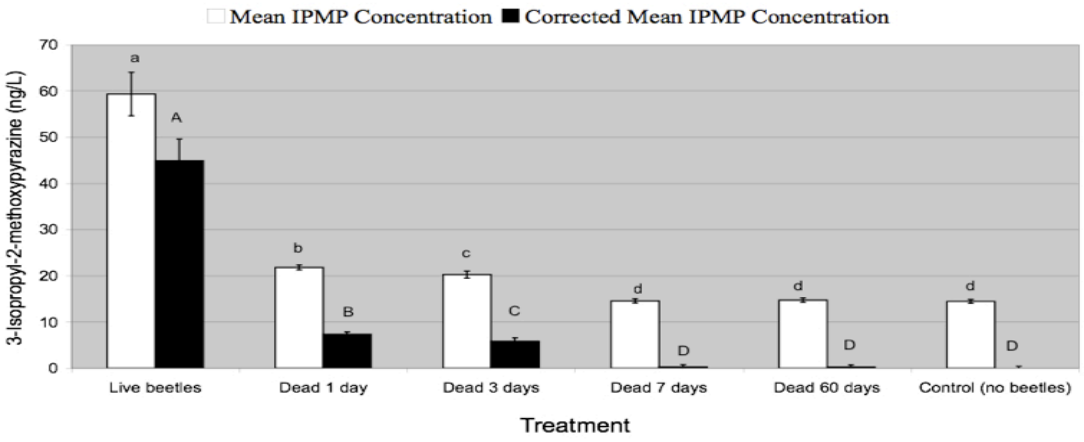


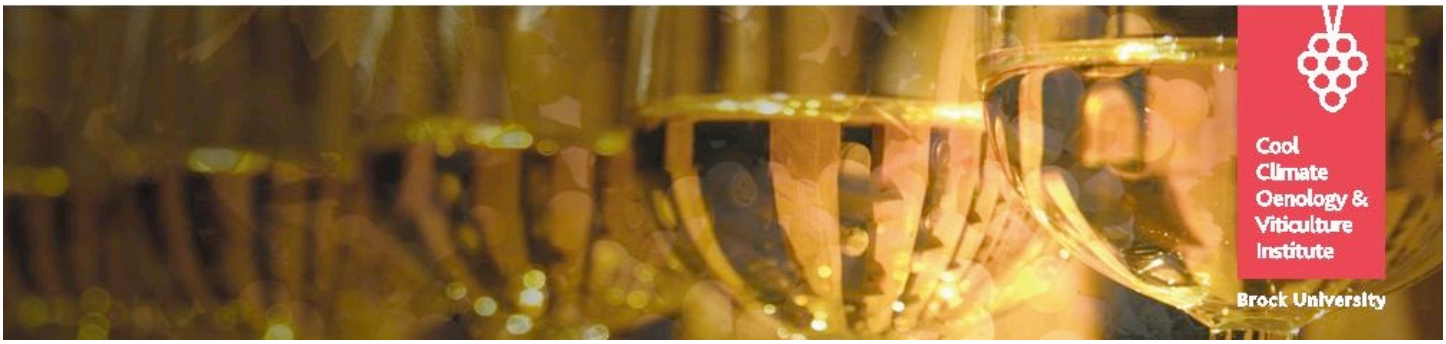
2. **Reduce lady beetles to 200-400 beetles per tonne to avoid taint issues.** Refereed studies by three independent research groups have determined the detection threshold of ladybug taint in wine at 1900 beetles per tonne (Galvan et al 2007, Am. J. Enol. Vit. 58, 518-522) and 1260-1530 beetles per tonne (Pickering et al, 2007, Vitis, 46, 85-90) or 1800 beetles per tonne for detection in juice grapes (Ross et al, 2007, Journal of Wine Research 18, 187-193). Limits may vary depending on grape variety, and the processing methods used, and it is difficult to get an accurate count of ladybugs in a one or four tonne bin. Thus a more conservative limit of 200-400 beetles/tonne is suggested.



3. **Use of shaker-tables for hand-harvested grapes to remove ladybugs.** Ladybugs can be partially removed from the grape cluster prior to de-stemming/crushing and pressing by using shaker tables. (Botezatu, A. and Pickering, G.J. 2010. Ladybug (Coccinellidae) taint in wine. In Reynolds, A. G. Understanding and Managing Wine Quality and Safety. Woodhead Publishing Limited, Cambridge, U.K., 418-429.)

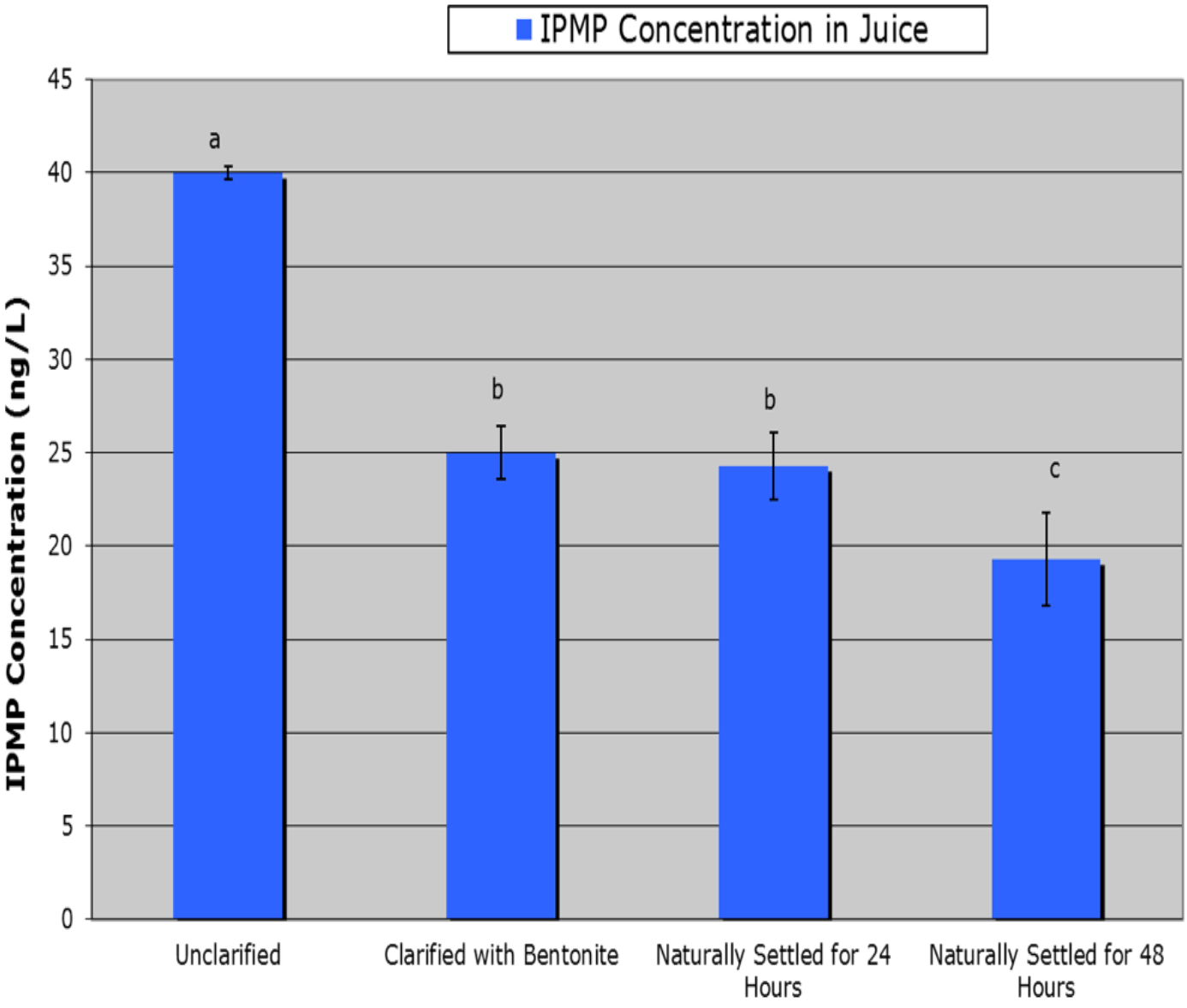
4. **Dead ladybugs can still taint wine between 3-6 days post mortem.** Dead ladybugs also have the capacity to taint wine. Taint characteristics were more pronounced with live beetles than dead beetles. However, dead beetles were still able to elicit negative impact on wine quality at 3 days post-mortem but not after 6 days post-mortem. (G. J. Pickering, M. Spink, Y. Kotseridis, I. D. Brindle, M. Sears and D. Inglis. 2008. The influence of Harmonia axyridis morbidity on 2-Isopropyl-3-methoxypyrazine in Cabernet Sauvignon wine. Vitis 47:227-230; G. J. Pickering, M. Spink, Y. Kotseridis, I. D. Brindle, M. Sears and D. Inglis. 2008. Morbidity of Harmonia axyridis mediates ladybug taint in red wine. Journal of food, Agriculture and Environment. 6:133-137.)

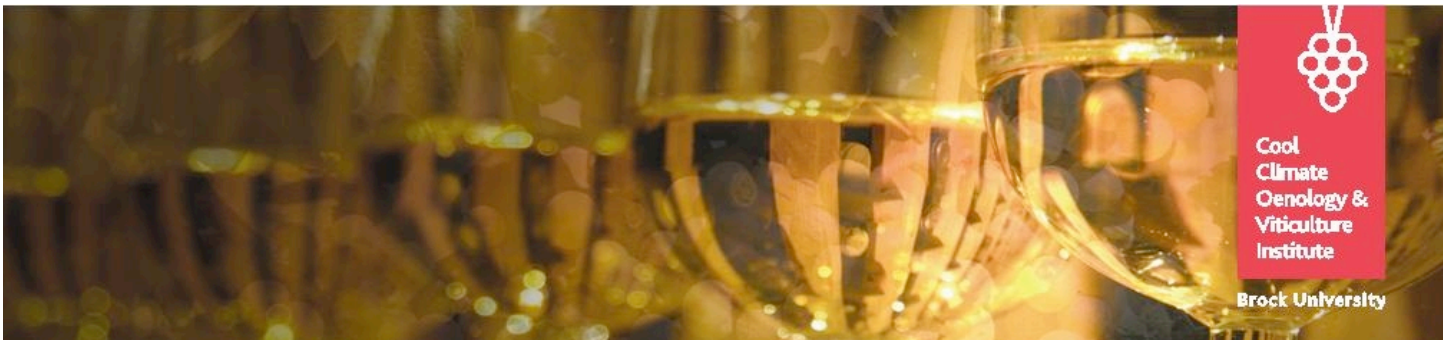




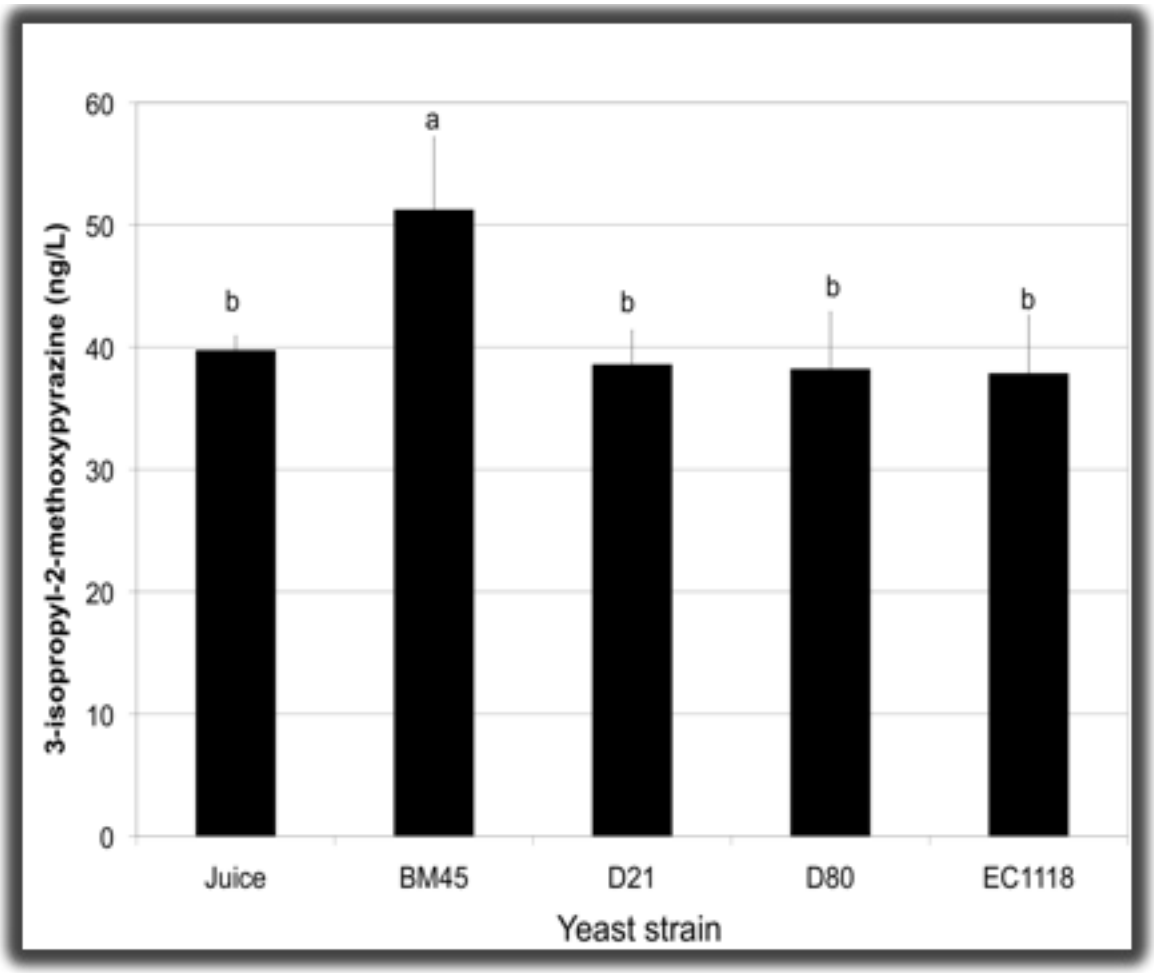
5. **Whole cluster press.** Reduce contact of ladybeetles with juice by whole cluster pressing as opposed to destemming and crushing.

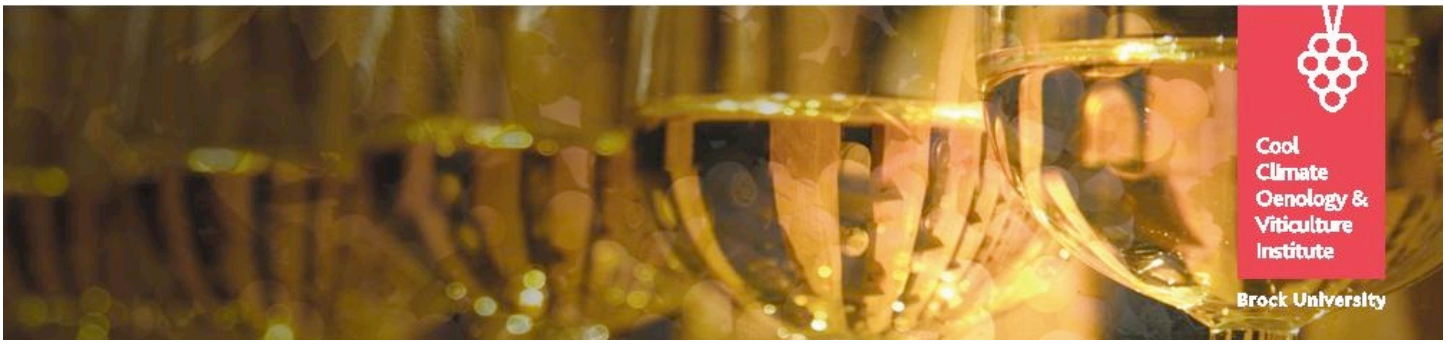
6. **Clarification of white wine juice.** Clarifying juice using bentonite (1 g/L) or naturally settling the juice for 48 hours significantly reduces MPs by approximately half in the juice prior to fermentation. (Y. Kotseridis, M. Spink, I. Brindle, A. J. Blake, M. Sears, G.J. Soleas, D. Inglis and G.J. Pickering. 2008. Quantitative analysis of 3-alkyl-2-methoxypyrazines in juice and wine using Stable Isotope Dilution Assay. Journal of Chromatography A, 1190:294-301.).



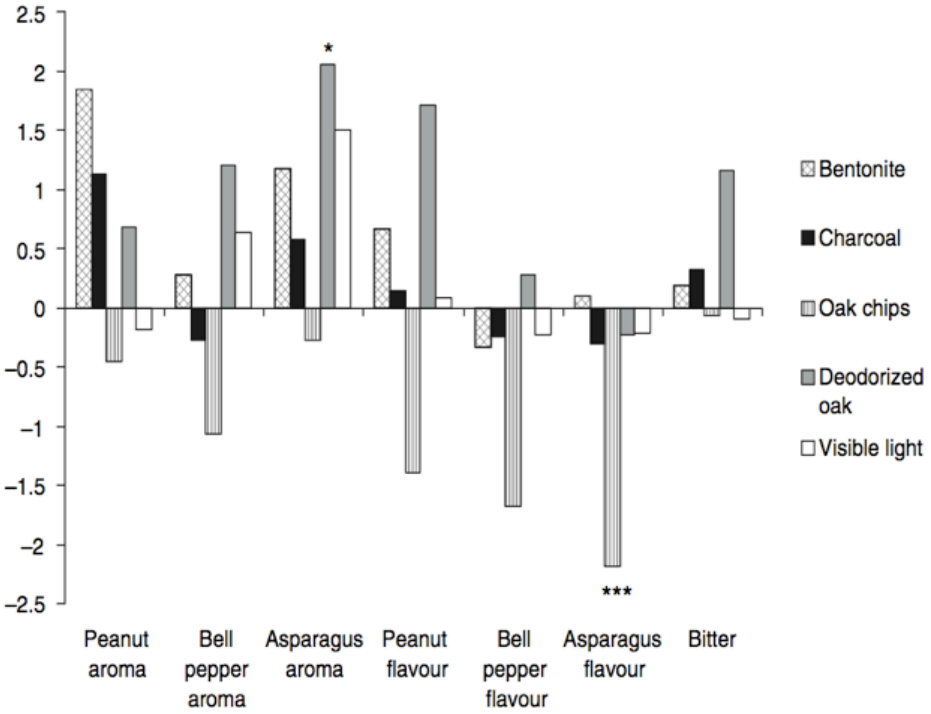


7. **Choose yeast strains carefully for fermentation.** Yeast strain trials using Cabernet sauvignon juice containing 40 ng/L isopropyl methoxypyrazine (the main MP that causes ladybug taint) showed yeast BM 45 increased IPMP levels and some green characteristics in wine so it is recommended to avoid using this yeast if ladybug taint is suspected in the juice. Yeast D21 produced wines with the lowest intensity of LBT sensory attributes. The decrease in greeness is likely due to a masking effect from the other aroma notes, in agreement with the masking effect of oak on LBT (see point 8). (G. J. Pickering, M. Spink, Y. Kotseridis, D. Inglis, I. D. Brindle, M. Sears and A-L Beh. 2008. Yeast strain affects 3-isopropyl-2-methoxypyrazine concentration and sensory profile in Cabernet Sauvignon wine. Australian Journal of Grape and Wine Research 14: 230-237).

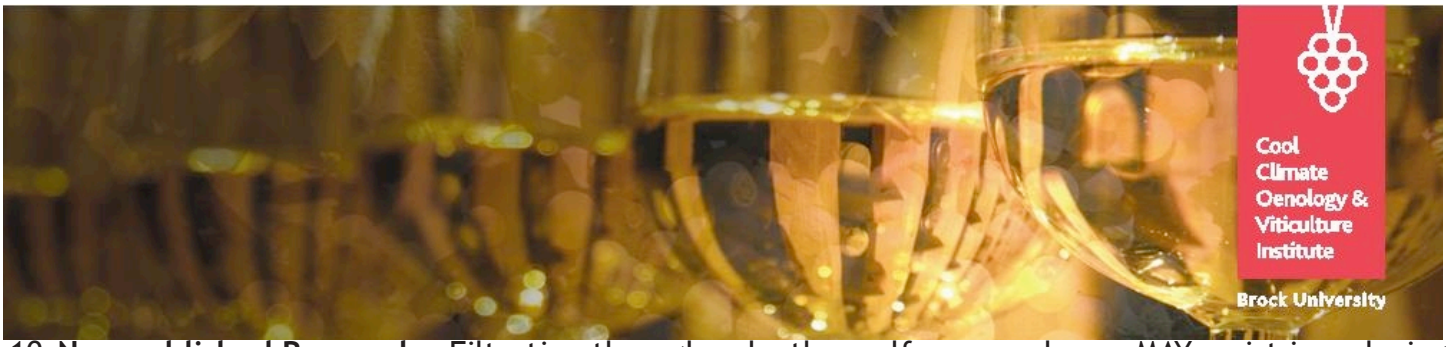




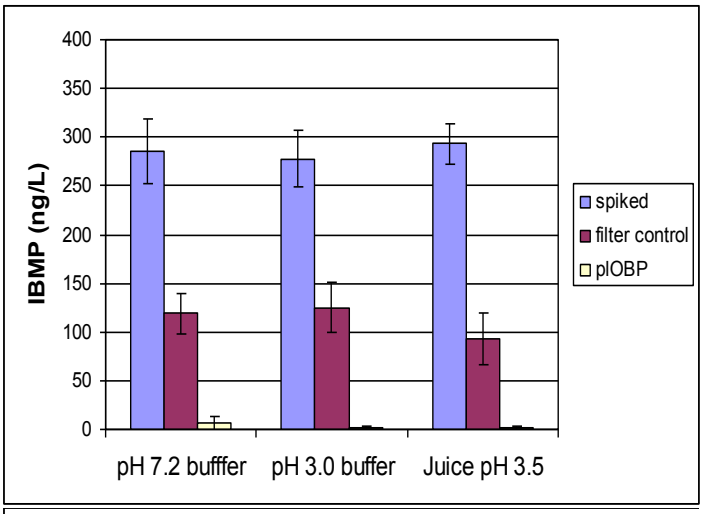
8. **For red wines, oak masks the ladybug taint well.** Pickering et al. (2006) The evaluation of remedial treatments for wine affected by Harmonia axyridis. Inter J Food Sci Tech, 41, 77-86.

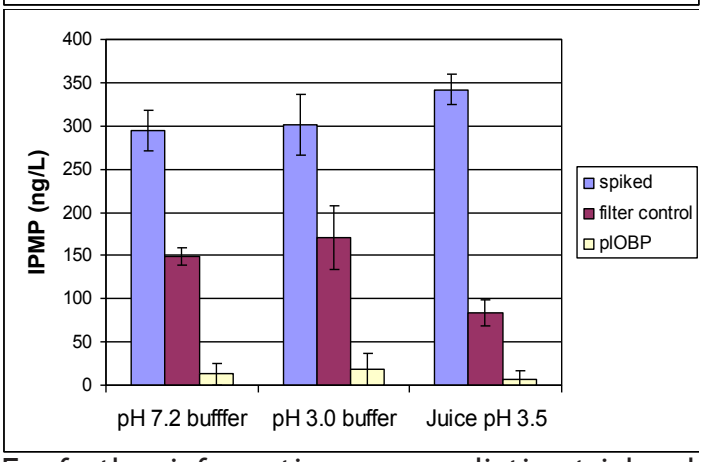


9. **Cork closures.** Synthetic cork closures or tetrapak containters may reduce MP levels over time once wine is bottled. Published research has shown sorptive properties of synthetic cork and tetrapak material reduces MPs in wine over time and may be an option to consider (Blake, A., Kotseridis, Y., Brindle, I., Inglis, D. and Pickering, G. 2009. The effect of closure and packaging type on 3-alkyl-2-methoxypyrazines and other impact odorants of Riesling and Cabernet Franc wine. J. Agric. Food Chem. 2009, 57, 4680–4690).



10. **Non-published Research.** Filtration through polyether sulfone membrane MAY assist in reducing MPs by non-specific adsorption. In developing a fining agent for MP removal in small scale laboratory experiments, it was found that filtration of juice through PES membrane reduced MPs by 1/2 to 2/3 the concentration in juice. This has not been tested on the commercial scale yet but studies are now underway (Inglis, D.L., Brindle, I., Pickering, G.P., Beh, A., Humes, E. Method for reducing methoxypyrazines in grapes and grape products. Patent filing PCT/CA2010/000568, April 14, 2010. International Publication Date October 21, 2010. PCT WO 2010/118523 A1).





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