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► To cite this version:

Rafael Apolinar Valiente, Thomas Salmon, Pascale Williams, Michael Nigen, Christian Sanchez, et al.. Acacia gum and sparkling wines: the beginning of a beautiful friendship?. 7. International Symposium on Macromolecules and Secondary Metabolites of Grapevine and Wine, 2018, Saragosse, Spain. 2018. hal-01982726

HAL Id: hal-01982726

<https://hal.science/hal-01982726>

Submitted on 15 Jan 2019

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Acacia gum and Sparkling Wines: the beginning of a beautiful friendship?



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In sparkling wines, the foam characteristic is the first quality observed by the consumer. Producers often add bentonite to the wine in order to prevent the protein haze. But bentonite treatments cause loss of wine “foamability”¹. Wine industry searches new techniques/treatments which prevent this undesirable effect. Acacia gum (AcG) is used in winemaking, mainly for stabilizing color in red wines. AcG can be fractionated by chromatographic techniques. HIC² provides 3 fractions with increasing hydrophobicity: HIC-F1, HIC-F2 and HIC-F3.

The objective of this study is to evaluate the impact of the addition of AcG or their HIC-fractions on the foamability of sparkling wines.

Materials & Methods :

A synthetic wine (SYWI) was prepared (12% v/v ethanol; 3 g.L⁻¹ of tartaric acid). 8 base wines from several origins (Spain: Tarragone -TA-, Saragosse -SA- and Malaga -MA-; France: Champagne Reims region -RE1, RE2, RE3, RE4 and RE5-) were elaborated by the traditional method. Wines were treated with bentonite (20 g.hL⁻¹), stirred gently (10 days, 4° C) and filtered (1 μm). A control without bentonite was performed in every wine (CWBE). Acacia *senegal* (*AsenG*) and Acacia *seyal* (*AseyG*) gums were separately added to SYWI (60 g.hL⁻¹) and to base wines (30 g.hL⁻¹). The fractions of *AsenG* obtained by HIC (HIC-F1, HIC-F2, HIC-F3) were also tested in SYWI (60 g.hL⁻¹) and in 2 selected base wines (MA and RE2) (30 g.hL⁻¹). The foaming parameters were compared by Shaking Test for SYWI samples and by classical Mosalux method³ for SYWI and for all the wines samples. **Shaking Test:** 15 mL of sample were introduced in tubes, being strongly shaken 12 times and pictures were taken every 10 seconds during 2 minutes (Shaking Test 1, or ST1). After 5 minutes, this process was once more repeated (Shaking Test 2, or ST2). The foam height (mm) was measured. **Mosalux method:** Pictures were also taken to look the foam quality after 4 minutes.

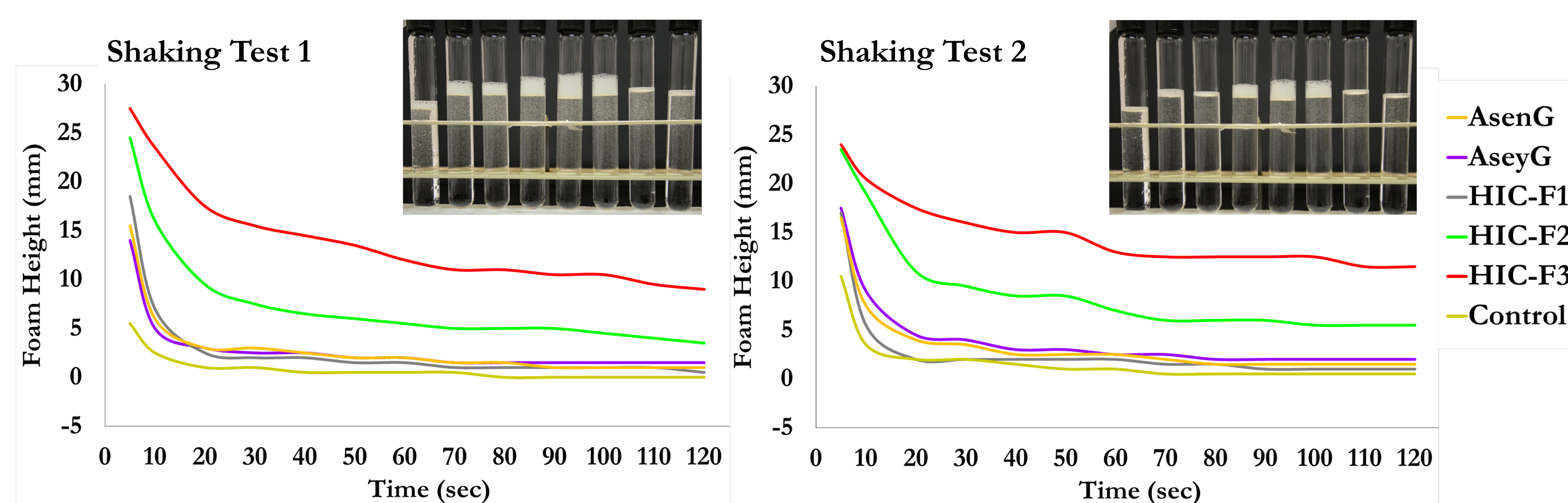


Figure 1. Foamability of control SYWI and SYWI with separate addition of *AsenG*, *AseyG* and HIC-fractions from *AsenG* were compared using shaking test.

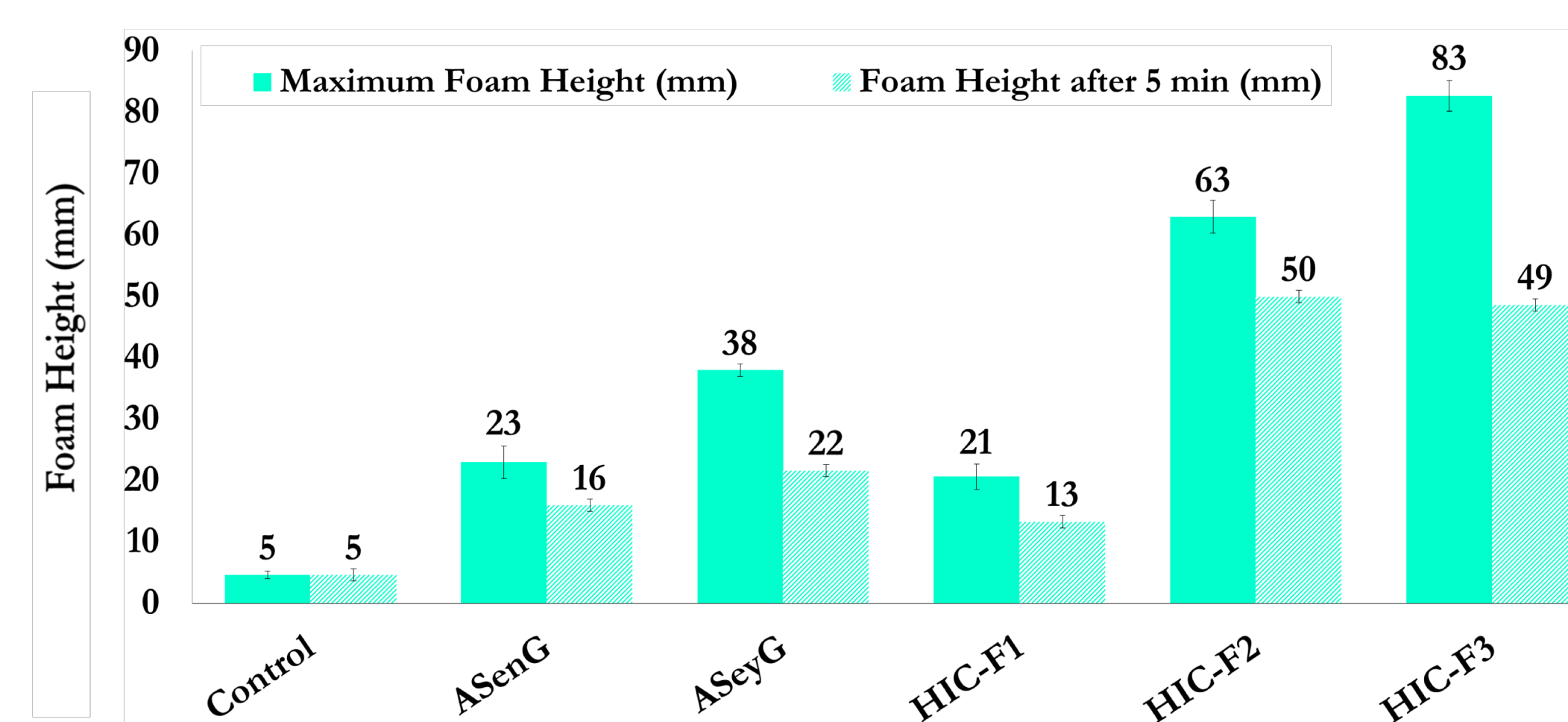


Figure 2. Maximum Foam Height (mm) and Foam Height at 5 minutes (mm) of control SYWI and SYWI with separate addition of *AsenG*, *AseyG* and HIC-fractions from *AsenG* measured by Mosalux equipment (sparging procedure).

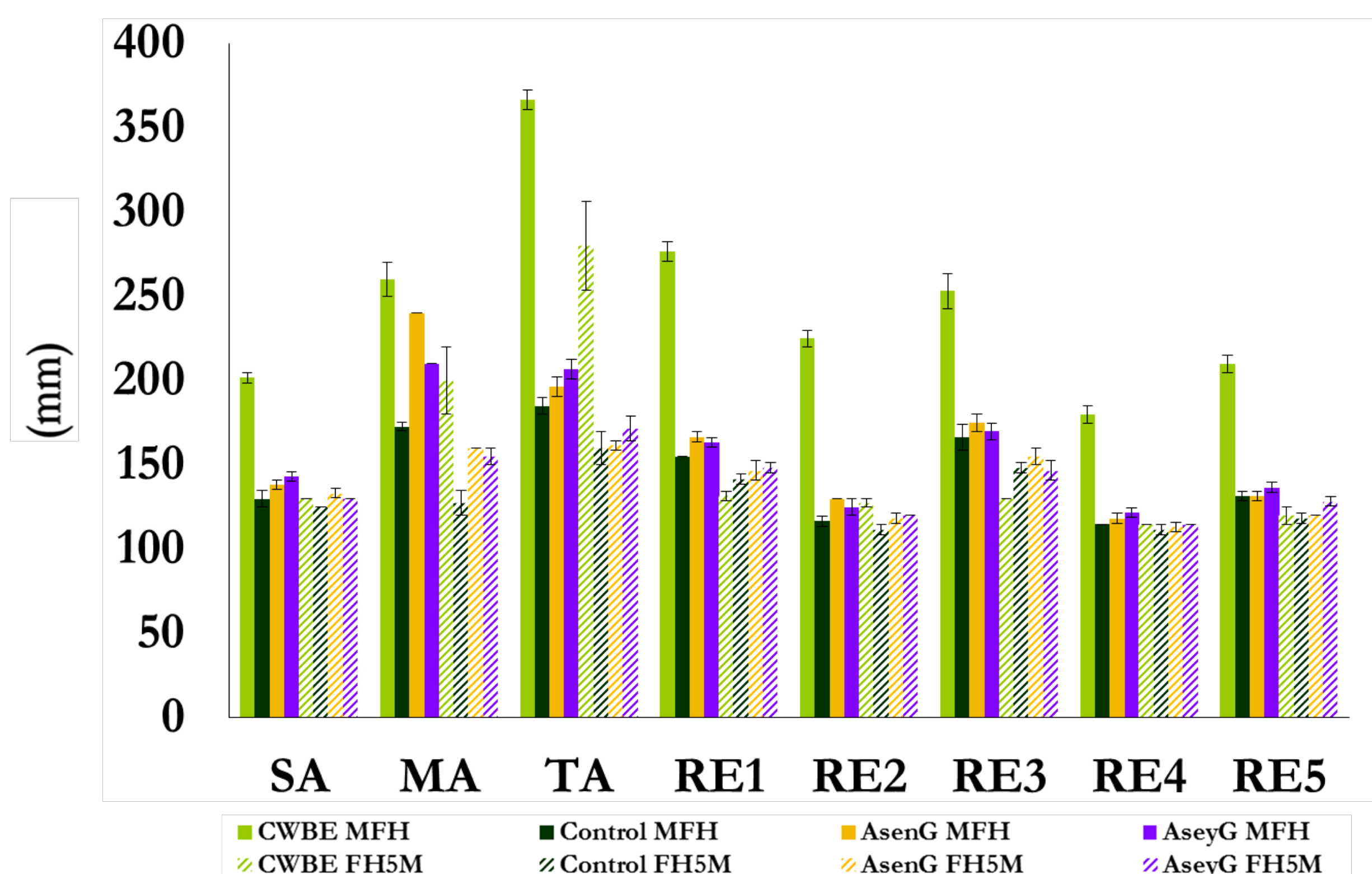


Figure 4. Maxim Foam Height (MFH; mm) and Foam Height at 5 minutes (FH5M; mm) of control without bentonite (CWBE), control and base wines with separate addition of *AsenG* and *AseyG* by Mosalux (sparging procedure).

AsenG increases MFH and FH5M respectively in five and three out of eight wines, whereas *AseyG* does likewise in six and four out of eight (Figure 4). In two selected MA and RE2 wines (Figure 5), both foaming parameters are enhanced when HIC-F2 is added to RE2 wine, improving this treatment MFH but not FH5M in MA wine. HIC-F3 shows an opposite effect in both foaming parameters depending on the wine: RE2 wine exhibits improving values but MA wine exhibits decreasing values.

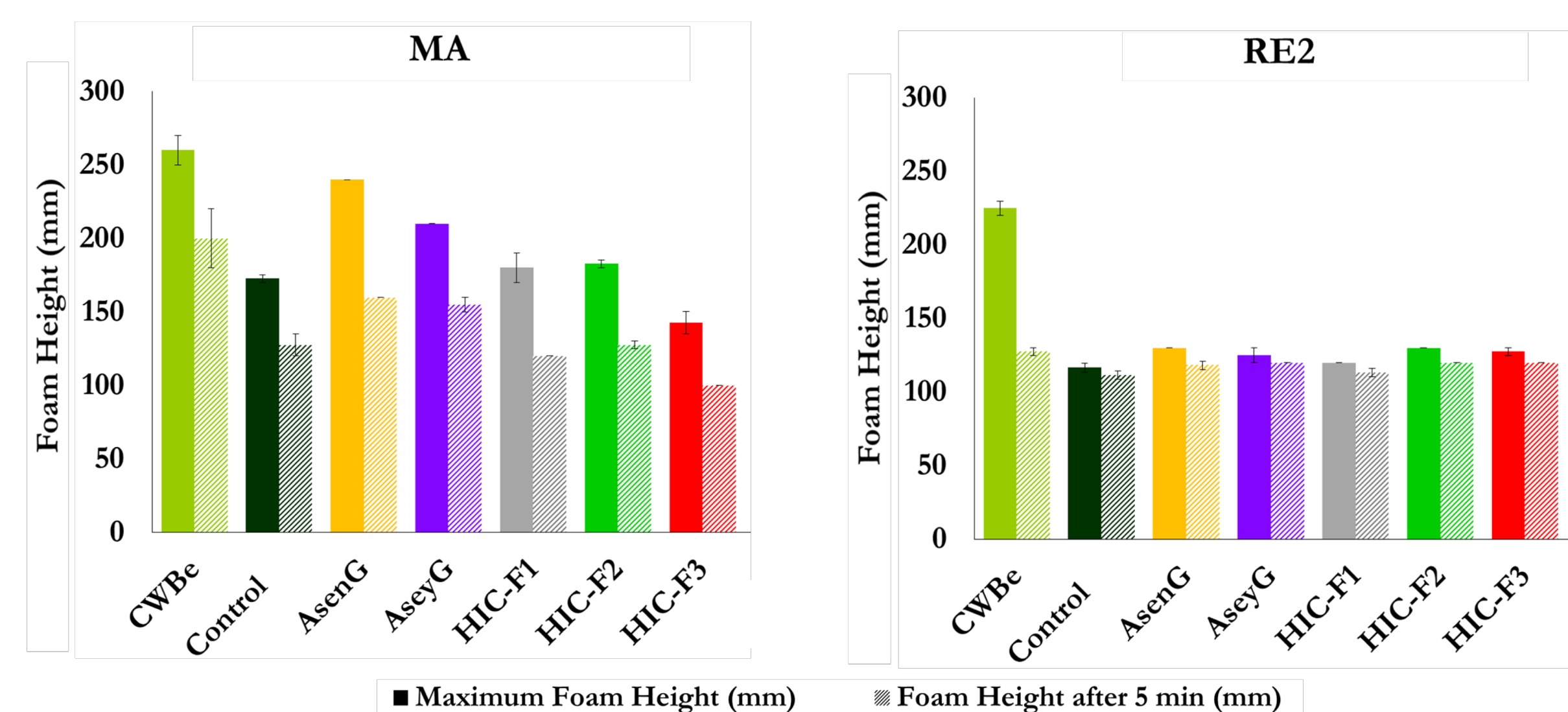


Figure 5. Maxim Foam Height (MFH; mm) and Foam Height at 5 minutes (FH5M; mm) of control without bentonite (CWBE), control and base wines with separate addition of *AsenG* and *AseyG* and HIC-fractions from *AsenG* by Mosalux (sparging procedure).

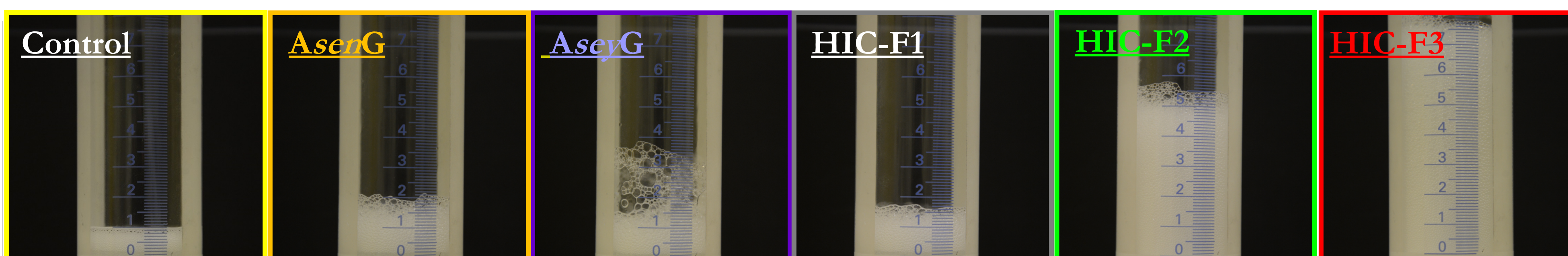


Figure 3. Foam pictures of control SYWI and SYWI with separate addition of *AsenG*, *AseyG* and HIC-fractions from *AsenG* at 4 minutes using a Mosalux equipment (sparging procedure).

In SYWI, HIC-F2, HIC-F3 and *AseyG* make increase the foam height during ST1 and ST2. *AsenG* and HIC-F1 show the same trend during ST1, but it appears only during the first half of ST2 in *AsenG* sample and only punctually in HIC-F1 sample (Figure 1). Concerning Mosalux method, all the treatments enhance the Maximum Foam Height and the Foam Height at 5 minutes, mainly HIC-F2 and HIC-F3 (Figure 2). Protein interfacial properties have been related to the molecule flexibility⁴, therefore the lower partial specific volume of fraction HIC-F1⁵ would imply lower interfacial properties, thus less foaming properties⁶. Similarly, fraction HIC-F3 presents the highest partial specific volume⁵ together with the greatest foamability. The mousse aspect appears as less compact and presenting larger bubble in *AseyG* sample (Figure 3).

The “foamability” of wines treated with bentonite differs greatly depending on the gum or the fraction gum treatment, but also on the wine. To increase the studied foaming parameters, *AseyG* appears as more effective gum than *AsenG*. The HIC-fractions from *AsenG* show varying effects on each foam parameter depending on the wine. Further studies about wines composition must be done to better understand the foamability behavior.

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