Structural characterization of the polysaccharides of Cabernet Franc, Cabernet Sauvignon and Sauvignon Blanc wines

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INTRODUCTION: There are few works about characterization of polysaccharides of wines. The structure and amounts of polysaccharides released depend on the winemaking process and can influence the sensory properties and quality of the wines. This work aimed structural characterization of the polysaccharides found in three types of wines: Cabernet Franc (WCF), Cabernet Sauvignon (WCS) and Sauvignon Blanc (WSB). MATERIAL AND METHODS: The wines were concentrated and the polysaccharides were obtained via ethanolic precipitation followed centrifugation, dialysis and freeze dry. The polysaccharides were analyzed by nuclear magnetic resonance. Monosaccharide composition was determined after total hydrolysis with TFA 100°C/1h by quantitative-HSQC. Homogeneity analyses were performed by HPSEC-MALLS. RESULTS: Polysaccharide yields were: 1.5% (WCF), 0.5% (WCS) and 0.2% (WSB). WCF showed Gal-(32.1%), Ara-(31.4%), Rha-(9.1%), Galα-(9.2%), Glc-(10.6%) and Man-(6.3%); WCS showed Gal-(18.6%), Ara-(15.1%), Rha-(9.2%), Galα-(12.0%), Glc-(18.7%) and Man-(26.4%); and WSB showed Gal-(19.1%), Ara-(19.2%), Rha-(4.7%), Galα-(4.1%), Glc-(12.7%) and Man-(40.2%). The total uronic acids content was determined for WCF, WCS and WSB, giving rise to 15.2%, 16.4% and 8.6%, respectively. All the samples showed a heterogeneous elution profile, suggesting the presence of polysaccharide mixture. HSQC-NMR spectroscopy indicated the presence at least four polysaccharides in all samples: An arabinogalactan type II (δ 103.2/4.47 (C1/H1) and 80.1/3.72 (C3/H3), which are characteristic of (1→3)-linked β-D-Galp and at δ 109.2/5.27 (C1/H1) of the α-L-Araf, type I rhamnogalacturunan (δ 99.2/5.14 (C1/H1) and 16.9/1.25 (C6/H6) of the α-L-Rhap and 98.02/5.11 (C1/H1) and 70.35/5.15 (C5/H5) of the the units (1→4)-linked GalA, dextrin (δ 95.86/4.55 and 100.1/5.29 attributed to D-Glc), and mannann (δ 99.17/4.89 and 65.3/3.76 of the units (1→6)-linked β-D-mannan). CONCLUSION: The results suggest that the HSQC NMR of the polysaccharides can furnish a fingerprint for each wine, since the profile of the mixtures had different yields and quantities, aiding for a non-volatile based singular signature.

Keywords: arabinogalactan, mannan, rhamnogalacturunan.