

Formation of new stable pigments from condensation reaction between malvidin 3-glucoside and (–)-epicatechin mediated by acetaldehyde: Effect of tartaric acid concentration

Baoshan Sun*, Tania Barradas, Conceição Leandro, Cláudia Santos, Isabel Spranger

Estação Vitivinícola Nacional, Instituto Nacional de Recursos Biológicos, I.P., Quinta da Almoinha, 2565-191 Dois Portos, Portugal

Received 13 November 2007; received in revised form 8 December 2007; accepted 7 February 2008

Abstract

The objective of this work was to study the effect of tartaric acid concentration on the condensation reaction between malvidin 3-glucoside (Mv-glc) and flavanols mediated by acetaldehyde in the model solution. The model wine solutions were prepared by 12% ethanol in water (v/v) with two different L-tartaric acid concentrations (5 g/l and 25 g/l, respectively) and at two different pH values (3.2 and 1.7, respectively). Four new pigments were detected in model wine solutions containing Mv-glc, (–)-epicatechin and acetaldehyde. By reverse-phase HPLC-DAD, ESI-MS and MSⁿ fragmentation analysis, the four new pigments were tentatively identified as four isomers of hydroxyethyl malvidin-3-glucoside-ethyl-flavanol. The decrease in the concentration of Mv-glc and (–)-epicatechin and the increase in the concentration of the new identified pigments were more pronounced at higher tartaric acid concentration. At pH 1.7, although the two well-recognized ethyl-linked Mv-glc-flavanol isomers were quantitatively the major pigmented products in the reaction solution throughout the assay period, they appeared less stable than the four new pigments. At pH 3.2, the rate of formation of ethyl-linked Mv-glc-flavanol pigments was much slower than at pH 1.7, whereas the four new pigments were quantitatively the predominant pigmented products at the latter stage of the reaction.

© 2008 Elsevier Ltd. All rights reserved.

Keywords: Malvidin 3-glucoside; (–)-Epicatechin; Acetaldehyde; Tartaric acid; Condensation reaction

* Corresponding author. Fax: +351 261712426.

E-mail address: evn.sun.baoshan@mail.net4b.pt (B. Sun).