

TRANSGLYCOSYLATION REACTIONS, A MAIN MECHANISM OF PHENOLICS INCORPORATION IN COFFEE MELANOIDINS AND THEIR INHIBITION BY MAILLARD REACTION

Manuel A. Coimbra^{1*}

¹ University of Aveiro, Aveiro, Portugal

*Corresponding author - E-mail: mac@ua.pt, Phone: 234370706

Melanoidins are brown compounds and a main component of coffee brews [1]. Although their detailed structure is not yet known, some important structural features have been elucidated in recent years, as the presence of covalently-linked polysaccharides, proteins and phenolic compounds. Although polysaccharides depolymerize under roasting conditions, they are also able to polymerize, forming new polysaccharides through non-enzymatic transglycosylation reactions (TGRs) [2,3]. TGRs can also occur between carbohydrates and aglycones containing hydroxyl groups, such as chlorogenic acids present in daily used consumed foods like coffee [4]. The dry environments at high temperatures, as those occurring when foods are roasted, are able to promote new acetal and ketal groups between carbohydrates, phenolic compounds, organic acids, and amino acids. Because proteins are very reactive with reducing sugars through Maillard reaction, their presence plays a regulatory role concerning TGRs extension. Although some specific reactions are more favorable than others, they occur randomly, leading to the formation of highly complex polysaccharide-based polymeric brown compounds. Because food is very heterogeneous in its composition, it is not possible to have a unique melanoidin structure. However, it is possible to predict the major patterns promoted by the carbohydrate and phenolic moieties.

[1] Moreira, A.S.P. et al., Coffee melanoidins: structures, mechanisms of formation and potential health impacts. *Food Funct.* 2012, 3, 903-915.

[2] Moreira, A.S.P. et al., Transglycosylation reactions between galactomannans and arabinogalactans during dry thermal treatment. *Carbohydr. Polym.* 2014, 112, 48-55.

[3] Moreira, A.S.P. et al., Non-enzymatic transglycosylation reactions induced by roasting: new insights from models mimicking coffee bean regions with distinct polysaccharide composition. *J. Agric. Food Chem.* 2016, 64, 1831-1840.

[4] Moreira, A.S.P. et al., Chlorogenic acid-arabinose hybrid domains in coffee melanoidins: evidences from a model system. *Food Chem.* 2015, 185, 135-144.

Keywords: *Roasted foods, Melanoidins, Polysaccharides, Phenolic compounds, Maillard reaction*

Acknowledgement: *Thanks are due to Fundação para a Ciência e a Tecnologia (FCT, Portugal), European Union, QREN, FEDER, and COMPETE for funding the QOPNA research unit (project PEst-C/UI0062/2013; FCOMP-01-0124-FEDER-037296), and the Portuguese Mass Spectrometry Network (REDE/1504/REM/2005).*