

### Dans les revues à comité de lecture de 2005 à 2006

S. CHÉRIOT, C. BILLAUD, J. NICOLAS. (2006). **Use of experimental design methodology to prepare Maillard reaction products from glucose and cysteine inhibitors of polyphenoloxidase from eggplant (*Solanum melongena*)**. *J. Agric. Food Chem.*, 54, 5120-5126. **Abstract** : Polyphenol oxidase (PPO) from eggplant was extracted and partially purified by a two-step fractionation-precipitation using ammonium sulfate and phenylsepharose hydrophobic interaction chromatography. The eggplant PPO extract was characterized concerning its kinetic properties. Optimal conditions to obtain Maillard reaction products (MRPs) with a maximal inhibitory potency (IP) toward PPO activity were determined using the surface response methodology and a four-factor and five-level experimental design. The MRPs were prepared from cysteine (0.25 M) and glucose (0-1 M), at several initial pH values (2-6) and at differing heating times (3-19 h) and temperatures (95-115 °C). The maximal IP was obtained after heating a model system of glucose/cysteine (1/0.25 M) at pH 2 for 3 h 20 min at 115 °C. The soluble part of this MRP, called MRP, was a noncompetitive inhibitor toward eggplant PPO. The IP of MRPs on PPO activity was very potent as compared to that displayed by benzoic, p-coumaric, and t-cinnamic acids, as well as sorbic acid and 4-hexylresorcinol. The activity of preincubated PPO at 0 °C with MRPs was only slightly restored after dialysis or gel filtration. **Keywords**: Maillard reaction products; cysteine; eggplant; polyphenol oxidase; enzymatic browning

Loïc LEVAVASSEUR, Lalatiana RAKOTOZAFY, Elise MANCEAU, Loïc LOUARME, Hugues ROBERT, Jean-Luc BARET, Jacques POTUS and Jacques NICOLAS (2006) **Discrimination of wheat varieties by simultaneous measurements of oxygen consumption and consistency of flour dough during mixing**. *Journal of the Science of Food and Agriculture*, 86:1688-1698. **Abstract**: Using an instrumented mixing - reactor, oxygen consumption and torque evolution were recorded during the mixing of wheat flour doughs obtained from eight pure French wheat varieties harvested in 2002 and 2003. Wheat flours were also characterised by biochemical analyses including lipoxxygenase activity (LOX) assay, free polyunsaturated fatty acids (PUFA) content, glutathione and ferulic acid contents, results of alveograph and farinograph tests and breadmaking performances. Some parameters defined from the obtained torque curves, equivalent to consistency curves, were correlated with alveograph and farinograph data. The importance of LOX activity levels and free PUFA content to explain the oxygen consumption during mixing is confirmed. In addition of the characteristics of the oxygen consumption curves, the extent to which the consistency curve parameters are able to differentiate among doughs made with flours issued from different wheat varieties is considered. **Key Words**: Mixing - oxygen - consistency - wheat - discrimination - lipoxxygenase.

Fanny Leenhardt, Bernard Lyan, Edmond Rock, Aline Boussard, Jacques Potus, Elisabeth Chanliaud, and Christian Remesy (2006). **Wheat Lipoxxygenase Activity Induces Greater Loss of Carotenoids than Vitamin E during Breadmaking**. *J. Agric. Food Chem.*, 54 (5), 1710 -1715. **Abstract**: The current study was undertaken to provide solutions to optimize the unsaponifiable antioxidants content of bread. We report a complete description of changes in wheat carotenoids and vitamin E content from grain to bread and highlight the most important processing steps affecting their level in wheat bread. Major carotenoids losses occurred during kneading. A close correlation ( $r^2 = 0.97$ ;  $P = 0.05$ ) was found between carotenoid pigment losses and lipoxxygenase (LOX) activity, both parameters depending on wheat genotype. The use of wheat species exhibiting high carotenoid contents and low LOX activity was shown to preserve significant carotenoid level in the bread. No relation was found between vitamin E losses during doughmaking and LOX activity. In addition, moderate kneading resulted in higher vitamin E retention in comparison with carotenoids (12% and 66% losses, respectively). It is concluded that carotenoids are more susceptible to oxidation by endogenous lipoxxygenase than vitamin E during breadmaking. This study showed that bread nutritional quality, in terms of antioxidant content, could be improved by selecting suitable cereal genotypes, if this potential is preserved by milling and baking processes. **Keywords**: Wheat; einkorn; milling fractions; breadmaking; carotenoids; lipoxxygenase; vitamin E

C. BILLAUD, C. MARASCHIN, Y-N. CHOW, S. CHÉRIOT, M-N. PEYRAT-MAILLARD, J. NICOLAS. (2005). **Maillard reaction products as « natural antibrowning » agents in fruits and vegetables technology**. *Molecular Nutrition and*

*Food Research*, 49, 1-7. **Abstract** : The effects of Maillard reaction products (MRPs) synthesized from a sugar ( pentose, hexose or disaccharide) and either a cysteine-related compound, an amino acid or a sulfur compound were investigated on polyphenoloxidase (PPO) activity from apple, mushroom and eggplant. The optimal conditions for the production of inhibitory MRPs were performed using two-factor and five-level central experimental designs. It resulted that thiol-derived MRPs were highly prone to give rise to inhibitory compounds of PPO activity. Technological assays were also performed to test the efficiency of selected MRP in the prevention of enzymatic browning in raw and minimally processed fruits and vegetables. **Keywords** : Enzymatic browning; Maillard reaction products; polyphenoloxidase; thiol compound.

C. BILLAUD, C. MARASCHIN, M-N. PEYRAT-MAILLARD, J. NICOLAS. (2005). **Maillard reaction products derived from thiol compounds as inhibitors of enzymatic browning of fruits and vegetables : structure-activity relationship.** *Annals of the New-York Academy of Sciences*, 1043, 1-10. **Abstract** : Some thiol-derived Maillard reaction products (MRPs) may exert antioxidant activity, depending on the reaction conditions as well as on the sugar and the sulphhydryl compound. Recently, we reported that MRPs derived from glucose or fructose with cysteine (CSH) or glutathione (GSH) mixtures highly inhibited polyphenoloxidases (PPO), oxidoreductases responsible for discoloration of fresh or minimally processed fruits and vegetables. Glucose and GSH were shown to be the most active in producing inhibitory MRP. Therefore, we examined the way in which the nature of reactants affected their synthesis, in order to establish a structure-activity relationship for the inhibitory products. Various aqueous (0.083, 0.125 or 0.25 M) mixtures of a sugar (hexose, pentose or diholoside) with either a CSH-related compound (CSH, GSH, N-acetyl-cysteine, cysteamine, cysteic acid, methyl-cysteine, cysteine methyl ester), an amino acid ( g glutamic acid, glycine, methionine) or other sulfur compound (thiourea, 1,4-dithiothreitol and 2-mercaptoethanol) were heated at 103 °C for 14 h. Soluble MRPs were compared for their ability to inhibit apple PPO activity. In the presence of CSH, the rated sugars (same molar concentration) ranked as to inhibitory effect were: pentoses > sucrose > hexoses <sup>3</sup> maltose. In the presence of glucose, the simultaneous presence of an amino group, a carboxylic group and a free thiol group on the same molecule seemed essential for the production of highly inhibitory compounds. **Keywords** : Maillard products; thiol derivative; enzymatic browning; polyphenoloxidase; inhibition; structure-activity relationship.

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